Nobis

FINAL WORK PLAN

VAPOR MITIGATION SYSTEMS
OPERABLE UNIT II REMEDIAL ACTION
NYANZA CHEMICAL WASTE DUMP SUPERFUND SITE
ASHLAND, MASSACHUSETTS

USACE CONTRACT NO. DACW33-03-D-0005
DELIVERY ORDER NO. 0005

REVISION NO.: 01

DATE: FEBRUARY 12, 2007

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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LIST OF ACRONYMS

AC	Alternating Current
ACM	Asbestos Containing Material
AHERA	Asbestos Hazard Emergency Response Act
ARARs	Applicable or Relevant and Appropriate Requirements
Ashland	Town of Ashland
ASTM	American Society for Testing and Materials
CAA	Clean Air Act
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
CQC	Contractor Quality Control
DCE	cis-1,2-dichloroethene
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Decision
FARs	Federal Acquisition Regulations
FOL	Field Operations Leader
FS	Feasibility Study
HSO	Corporate Health and Safety Officer
HVAC	Heating, Ventilating, and Air Conditioning
ICF	ICF International
MADEP	Massachusetts Department of Environmental Protection
MFR	Memorandum for the Record
M.G.L.	Massachusetts General Laws
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NFPA	National Fire Protection Agency
Nobis	Nobis Engineering, Inc.
NPL	Nation Priority List
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OU II	Operable Unit II
PPE	Personal Protective Equipment
psi	Ponds Per Square Inch
PVC	Polyvinyl Chloride
QCS	Quality Control System
RAOs	Remedial Action Objectives
RI	Remedial Investigation
RMS	Resident Management System
ROD	Record of Decision
SHSO	Site Health and Safety Officer
SMD	Sub-Membrane Depressurization
SOW	Scope of Work
SSHSP	Site-Specific Health and Safety Plan
SSD	Sub-Slab Depressurization
SVOCs	Semi-Volatile Organic Compounds
TCE	Trichloroethene
USACE	United States Army Corps of Engineers
VOCs	Volatile Organic Compounds
WC	Water Column

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1.0 PLAN IDENTIFICATION AND APPROVALS

Project Title:	Operable Unit II Remedial Action Nyanza Chemical Waste Dump Superfund Site
Project Location:	Ashland, Massachusetts
Contract No.:	DACW33-03-D-0005
Delivery Order No.:	0005
Nobis Project No.:	74060
Prepared By:	Amy Adams
Date Prepared:	2/12/07
Revision No.:	01

APPROVALS:

J. Michael Bradbury, P.E., Program Manager — Date: 2/12/07

Kurt Jelinek, P.E., Project Manager/Delivery Order Manager — Date: 2/12/2007

Amy Adams, Field Operations Leader — Date: 2/12/07

2.0 INTRODUCTION

This Work Plan was prepared by Nobis Engineering, Inc. (Nobis) to describe the overall project organization and general work approach for the installation of the vapor mitigation systems for Operable Unit II (OU II) at the Nyanza Chemical Waste Dump Superfund Site located in Ashland, Massachusetts. Nobis prepared this Work Plan for the U.S. Environmental Protection Agency (EPA) under contract to U.S. Army Corps of Engineers (USACE) New England District through Remedial Action Contract No. DACW33-03-D-0005, Delivery Order 0005. This Work Plan has been developed based on the December 4, 2006 (revised December 21, 2006) Statement of Work (SOW) issued by the USACE.

As a result of contamination from a number of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals, the Nyanza Chemical Waste Dump Superfund Site, hereinafter referred to as "the Site", was listed on EPA's National Priorities List (NPL) in 1982. Currently, the Site is undergoing investigation and clean-up activities pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The CERCLIS ID number for the Site is MAD990685422. The Site history is further described in Section 2.5. The location of the Site is shown in Figure 1.

2.1 Purpose and Scope

The remedial action to address OU II groundwater contamination was presented by the EPA in a Record of Decision (ROD), dated September 23, 1991 and subsequent Explanation of Significant Differences (ESD), dated September 29, 2006. OU II was created to collect data to refine the cleanup time estimates for the final ROD and address principal threats to human health and the environment posed by the site. The OU II remedial action was developed to meet the following Remedial Action Objectives (RAOs):

- Reduce migration of contaminants in groundwater.
- Reduce risks to human health associated with potential future consumption and direct contact with groundwater.
- Reduce risks from present and potential future inhalation of evaporated groundwater contaminants.
- Limit degradation of the Sudbury River and wetlands due to the natural discharge of contaminated groundwater.
- Comply with state and federal Applicable or Relevant and Appropriate Requirements (ARARs), including drinking water standards.

The remedial action selected to meet the above RAOs included installation of groundwater extraction and other wells, institutional controls, continued monitoring and inspection of residential and monitoring wells, and pre-design studies. This Work Plan was prepared in response to these ongoing activities and focuses on installation of vapor mitigation systems to prevent potential inhalation exposures and collect more data after installation.

The work scope for this Delivery Order includes the development of work plans, detailed cost estimates, and construction schedules to describe the installation of vapor mitigation systems in 39 structures (primarily residences) located in the northeast portion of the plume. The components of the vapor mitigation systems are described in detail in Section 2.4. The OU II work area is shown in Figure 2.

2.2 Report Organization

This Work Plan consists of seven sections: Section 1.0 provides plan identification and approval. Section 2.0 summarizes background information about the Site, report organization, submittal schedule, and a summary of the remedial action. Section 3.0 describes the project organization, procurement and subcontracting, and Site coordination. Section 4.0 identifies the applicable regulatory and permitting considerations for the project. Section 5.0 describes the project quality control program. Section 6.0 references the project health and safety program. Section 7.0 describes property access, mobilization and site preparation, preparatory work, vapor mitigation system installation, system startup and optimization, backdrafting evaluation, code enforcement inspection, site restoration and operation and maintenance. Figures, tables, and appendices are presented at the end of this document.

2.3 Submittal Schedule

The Work Plan will be submitted in accordance with the submittal schedule summarized below.

Submittal Schedule

Work Plan Submittal	Submittal Date
Draft Work Plan to USACE	***January 23, 2007***
Review Comments to Nobis	***February 1, 2007***
Final Work Plan to USACE	***February 12, 2007***

A Site-Specific Health and Safety Plan (SSHSP) will also be prepared and submitted under separate cover as a stand-alone project plan.

2.4 Summary of Selected Remedial Action

This Work Plan addresses the installation of the vapor mitigation systems as part of the OU II Remedy. Therefore, the remaining remedial actions outlined in Section 2.1 are not summarized here.

2.4.1 Vapor Mitigation Systems (Engineering Controls)

Forty-one vapor mitigation systems will be installed in 39 structures (primarily residences) located above the most contaminated area of the groundwater plume. This area is generally bracketed by Tilton Avenue and Water Street to the west, the Sudbury River to the north and east, and the railroad tracks to the south (Figure 2) and was selected because:

- Nearly all the structures that were sampled for vapors in indoor air within this area exceed EPA's proposed target risk range based on inhalation vapors;
- Concentrations of contaminants in groundwater beneath this area, particularly trichloroethene (TCE), are the highest within the overall shallow groundwater plume; and
- Modeling suggests that all structures within this area may be susceptible to inhalation risks from vapor intrusion.

The active vapor mitigation systems consist of small diameter polyvinyl chloride (PVC) pipes, which are attached to a continuously operating fan. The system works by installing one or more pipes through the basement floor and into the sub-slab area. The piping will then be routed

outside the home and above the roofline where the vapors will be allowed to discharge into the atmosphere. A single small diameter fan will be placed along the piping route (outside) to maintain a positive pressure and continually draw the vapors from the sub-slab to the atmosphere. Once discharged, the vapors are diluted and no longer pose a potential threat to human health and the environment.

Prior to the design and installation of the active vapor mitigation systems, the following preparatory work will be conducted:

- A survey and inspection of the basement will be conducted to obtain pertinent building information.
- For basements with cracks, joints, and other possible vapor entry points such as sumps and/or floor drains in the foundations, repair work will be done to seal these potential entry routes.
- For basements with an earthen floor, the floor will be sealed with either an impermeable barrier or concrete.
- Diagnostic tests will be conducted to determine the airflow characteristics and capacity of the sub-slab materials.

Subsequent to the active vapor mitigation system installation, all system components will be inspected to verify proper functioning. Any adjustments that may need to be completed will be conducted at this time.

One property, Property B as shown on Table 1, currently has a passive vapor mitigation system that was put in place as part of renovations performed in 2004. As part of this work assignment, the passive system will be upgraded to an active vapor mitigation system with a fan(s), monitors, and alarms to ensure that vapors are properly collected and vented.

2.5 Site Background

This section describes the history of the Site.

2.5.1 Site Description

The Site is located in the Town of Ashland, Middlesex County, Massachusetts, approximately 25 miles west-southwest of Boston and 20 miles east-southeast of Worcester (Figure 1). The Site is comprised of three distinct areas (Figure 2): 1) the 35 acre former Nyanza, Inc. property which currently consists of several wetlands, the Megunko Hill area, and the lower industrial area along Megunko Road; 2) drainage ways between the former Nyanza, Inc. property and the Sudbury River, consisting of the Eastern Wetland, Trolley Brook, Outfall Creek, and the Lower Raceway; and 3) a 33-mile stretch of the Sudbury River down to its confluence with the Assabet River in Concord, Massachusetts. The Sudbury River is approximately 700 feet north of the Site. Approximately 10,000 people live within 3 miles of the Site.

Due to the complexity of contamination discovered at the Site, EPA divided cleanup activities into four OUs. OU I includes the former Nyanza, Inc. property and several adjacent upland and wetland areas where soils and sludges were contaminated with heavy metals, VOCs, and SVOCs. OU II includes a groundwater plume of organic contamination that extends from the former Nyanza, Inc. property in a north/northeasterly direction toward the Sudbury River. OU III includes the Eastern Wetland, Trolley Brook, Outfall Creek, and the Lower Raceway. These drainage ways are located between the former Nyanza, Inc. property and the Sudbury River.

OU IV includes a 33-mile stretch of the Sudbury River where sediment and fish are contaminated with mercury.

2.5.2 Site History

From 1917 through 1978, several companies involved in the manufacture of textile dyes and dye intermediates, inorganic colloidal solids, and acrylic polymers occupied the Site. Nyanza, Inc. was the most recent dye manufacturing company to occupy the Site, operating from 1965 to 1978. The former plant grounds are currently occupied by several industrial businesses, the largest of which is Nyacol Products, Inc.

Starting in 1917, several types of chemical waste were disposed of in various on-site locations with the majority of these wastes deposited on Megunko Hill, which was used as an unsecured landfill. Wastes included partially treated process wastewater, chemical sludge from the wastewater treatment process, solid process wastes (e.g., chemical precipitate and filter cakes) in drums, solvent recovery distillation residues in drums, and off-specification products. Process chemicals that could not be recycled or reused (including phenol, nitrobenzene, and mercuric sulfate) were also disposed of on the property. Over 45,000 tons of chemical sludges generated by wastewater treatment processes, along with spent solvents and other chemical wastes, were buried on the property. The area that contained the largest amount of buried waste and exposed sludge was referred to as the Hill section.

Nyanza, Inc. and its predecessors originally discharged waste to a concrete vault (or settling pond) adjacent to the main process building. The vault was used as a central sump for the collection of wastewater from the entire Nyanza, Inc. operation, as well as from other generating tenants housed in the immediate vicinity. This vault was approximately 40 by 80 feet and approximately 10 feet deep. The liquid occasionally overflowed via a pipe into Chemical Brook, which flowed into Trolley Brook and underground through Chemical Brook Culvert into Outfall Creek, and then into the Raceway that entered the wetlands along the Sudbury River. The vault was taken out of service in the 1960s or 1970s, but continued to be a source of groundwater contamination at the Site until its removal in 1988. . Nyanza, Inc. connected to the Metropolitan District Commission sewer collection system in March 1970.

Since 1972, several investigations have been prompted by contamination present at or originating from the Site. The Site was included on the original NPL of Superfund Sites in 1982. The ROD for the first operable unit at Nyanza was signed on September 4, 1985. This source control remedy called for the excavation of outlying on-site sludge and their consolidation under an impermeable cap. OU I cleanup actions were completed in late 1992. The ROD for the third operable unit, dealing with contamination of the Sudbury River and its tributaries, was signed on March 30, 1993. Cleanup activities were completed in August 2001. As of 2004, risk assessment activities were ongoing and a ROD had not been completed for OU IV. This Work Plan is for remedial activities under OU II which are described below.

2.5.2.1 Operable Unit II

In June 1987, EPA authorized the initiation of investigative activities for OU II to address contaminated groundwater migrating from the Site. The Remedial Investigation (RI) and Feasibility Study (FS) were completed in 1991. The ROD for OU II was signed on September 23, 1991. The selected remedy included extraction and treatment of contaminated groundwater for a minimum of five years and conducting additional studies.

Technical design studies for the selected remedy began in early 1992. The discovery of dense non-aqueous phase liquid (DNAPL) in 1994 during the installation of the pump-test groundwater extraction well in the northern portion of the Site raised concerns about the effectiveness of a pump and treat remedy. A pilot scale treatment system had been constructed; however, it was not designed to treat an influent containing DNAPL. As a result of the DNAPL discovery, the pilot scale system was not tested and the full-scale design was postponed. Since this time, EPA has been collecting additional data and examining other options for treating the groundwater contamination.

Groundwater monitoring was initiated in 1998 on a semi-annual basis and continued until the Fall 2003. A number of VOCs, SVOCs, and metals were detected at elevated concentrations in the overburden and bedrock groundwater at the Site. The primary contaminants included chlorobenzene, dichlorobenzene, nitrobenzene, TCE, cis-1,2-dichloroethene (DCE), vinyl chloride, and mercury. While the contaminant concentrations exceed federal and state drinking water standards, the Town of Ashland does not use groundwater from the plume for their drinking water supply.

The results of the semi-annual groundwater monitoring prompted EPA to undertake indoor air sampling programs in 1998 and 2004 to determine if contaminants in the groundwater were volatilizing and migrating into homes and businesses at levels that might affect public health. EPA had previously performed indoor air sampling at five homes and Town Hall in 1990. Recent risk assessment results presented in the Indoor Air Human Health Risk Assessment prepared by ICF International (ICF) on October 25, 2005 (ICF, 2005) indicate that an incremental cancer risk exceeded the EPA's acceptable risk range of 1×10^{-6} to 1×10^{-4}, when proposed toxicity information for TCE is applied, in some of the residential homes where indoor air samples were collected, as well as in Ashland Town Hall. Modeling was also performed as part of the risk assessment to evaluate the potential risks in a "typical house or business" located above the contaminated shallow groundwater plume. The modeling also revealed an unacceptable incremental cancer risk related to vapor intrusion. TCE represents the majority of the estimated cancer risk.

Between 1999 and 2003, several studies were also conducted to evaluate potential ecological risks posed by the groundwater plume discharging into the Sudbury River. Results indicated that aquatic life was impacted in one of three areas studied, but that the impact could not definitively be tied to the groundwater plume or other existing natural habitat conditions such as storm water runoff, low dissolved oxygen levels, stagnant water, and high amounts of detritus (leaf litter).

Based on the discovery of DNAPL and the potentially unacceptable inhalation risks described above, an ESD was prepared by the EPA in September 2006 to further the goals for groundwater remediation established in the 1991 ROD (Section 2.1).

3.0 PROJECT MANAGEMENT

This section details the project management activities for the Site.

3.1 Project Organization

The Project Team for this Delivery Order has been organized to provide the USACE with qualified and efficient technical and management staff with clearly defined lines of authority and responsibilities. Key project personnel and positions are listed below including the following

Agencies: USACE, EPA, and Massachusetts Department of Environmental Protection (MADEP).

Key Project Personnel and Positions

Project Personnel	Project Positions
KC Mitkevicius	USACE Project Manager
Peter Hugh	USACE Engineering Technical Lead
Raushanah Muhammad	USACE Project Engineer/Construction Representative
Jim DiLorenzo	EPA Remedial Project Manager
Jim Murphy	EPA Community Involvement Coordinator
Dave Buckley	MADEP Project Manager
J. Michael Bradbury, P.E.	Nobis Program Manager
Kurt Jelinek, P.E.	Nobis Project Manager/Delivery Order Manager
TBD	Nobis Contractor Quality Control System Manager
Tom Bobowski	Nobis Corporate Health & Safety Officer
Amy Adams	Nobis Field Operations Leader
Amy Adams	Nobis Site Health and Safety Officer

The following is an outline of Nobis project personnel responsibilities:

Program Manager

The Program Manager is responsible for the overall development, coordination, and contractual compliance of all program efforts. Specific responsibilities include:

- Maintaining communication with the Project and Site Managers, as necessary, to ensure proper progress;
- Ensuring completion of contractual requirements by Nobis and by all subcontractors retained by Nobis; and
- Monitoring the performance and communication of the project management and field personnel regarding their project responsibilities on a regular basis.

Project Manager/Delivery Order Manager

The Project Manager/Delivery Order Manager is responsible for the development, coordination, and technical performance of Project tasks. Specific responsibilities include:

- Overseeing of, and communicating with, the Contractor Quality Control System Manager, Project Safety Personnel, and Field Operations Leader (all defined below);
- Ensuring the completion of all tasks required in accordance with the Project Contract;
- Adhering to the established project schedule;
- Providing all required submittals to appropriate USACE personnel;

- Providing information to the USACE, other Agencies, and building owners/occupants regarding progress;
- Supporting the USACE in public communication as needed; and
- Assuring technical accuracy, product quality, regulatory compliance, the health and safety of project personnel, and overall management of employees working on his/her project;

Contractor Quality Control (CQC) System Manager

The CQC System Manager is responsible for implementing and maintaining the CQC System established by the USACE to assure adequate quality of workmanship and products of the project. Implementation of CQC is detailed in Section 5.0. The CQC System Manager's responsibilities include:

- Identifying quality related problems;
- Initiating the level of corrective action necessary to result in the solution of quality deficient conditions;
- Verifying the implementation of those solutions;
- Accepting and/or rejecting any or all work, or materials associated with the project;
- Inspecting/re-inspecting the definable features of work during the preparatory, initial and final phases of work, and document results on the appropriate inspection forms;
- Insuring daily reports and records are accurate and complete; and
- Reviewing material submittals for conformance with the contract specifications.

The CQC System Manager shall have a direct line of communication to all project personnel, the contracting agency project engineer, subcontractors, material suppliers, vendors, services and regulatory agencies for the purpose of providing quality control directions and status of the program. All quality control related activities and/or problems should be directed to the CQC System Manager. The CQC System Manager shall represent the Project Manager/Delivery Order Manager on all contacts with outside Quality Assurance agencies, such as code inspectors, subcontractors, vendors or suppliers. The CQC System Manager, or a designated alternate, shall be on-site at all times during the Site activities.

Corporate Health and Safety Officer (HSO)

Nobis' Corporate HSO has the overall responsibility for implementing Nobis' health and safety program, ensuring adequate resources are available to administer the health and safety requirements of this contract and Delivery Order. Specific responsibilities include:

- Reviewing and approving Draft SSHSP;
- Serving as the primary contact to review safety and health measures that may arise;
- Approving revised or new safety protocols for field operations;
- Coordinating revisions to the SSHSP with the Site Health and Safety Officer;
- Assisting in the investigation of major accidents;
- Selecting proper personal protective equipment (PPE) for planned Site activities; and

- Conducting periodic inspections for compliance with the SSHSP.

Site Health and Safety Officer (SHSO)

The SHSO is responsible to ensure that all elements of the SSHSP are implemented and enforced on-site. Specific responsibilities include the following:

- Ensuring that all on-site personnel have received and read the SSHSP and completed the SSHSP sign-off sheet;
- Ensuring that all personnel have attended a briefing apprising them of the SSHSP contents and potential Site hazards prior to working on-site;
- Ensuring that sufficient PPE and monitoring instrumentation are available, as required by the SSHSP, and is utilized by field teams;
- Directing and coordinating safety and health monitoring activities;
- Conducting and documenting daily safety meetings;
- Monitoring compliance with the SSHSP;
- Notifying Nobis HSO of all Incident/Accident investigations;
- Reviewing and maintaining Incident/Accident report forms;
- Determining to upgrade or downgrade PPE;
- Ensuring that monitoring instruments are calibrated;
- Reporting to Project Manager/Delivery Order Manager and Nobis HSO to provide summaries of health and safety related issues; and
- Maintaining safety and health field log books.

Field Operations Leader (FOL)

The FOL is responsible to ensure compliance with the Site work, regulatory compliance, quality, and the safety of employees working on the Site. Specific responsibilities include:

- Communicating with building owners and/or occupants;
- Coordination of subcontractors;
- Maintaining a project schedule;
- Conducting meetings with building owners and/or occupants;
- Maintaining frequent communication with the Project Manager/Delivery Order Manager and Nobis HSO;
- Maintaining a high level of health and safety awareness among field personnel;
- Assisting the SHSO to ensure that all field personnel work according to the procedures outlined in the SSHSP; and
- Assisting CQC System Manager with identifying quality-related problems and initiating the level of corrective action necessary to resolve quality deficient conditions.

3.2 Procurement and Subcontracting Plan

Procurement of goods and services under this Delivery Order will be performed in a consistent and cost-effective manner in compliance with applicable Federal Acquisition Regulations (FARs), USACE procedures, Nobis' acquisition management procedures, Nobis' USACE approved contract management procedures, and contract requirements. Anticipated procured/subcontracted goods and services will likely include the following:

- Site work subcontractor(s)
- Professional moving subcontractor
- Licensed Electrical subcontractor
- Professional roofer (Property B)
- Temporary storage units
- Equipment rental

3.3 Site Control, Coordination, and Liaison

Site controls, work coordination, and liaison for the OU II Remedial Action will be established through regular communication between Nobis, USACE, EPA, MADEP, homeowners, and other relevant parties and stakeholders. Coordination and liaison will be maintained to prevent misunderstandings leading to later changes and contractor lost effort, to maintain open communications about Site activities, to ensure minimal interference with other concurrent Site activities, and to ensure the overall safety and health of the environment, site personnel, and the general public, especially for the 39 property owners/occupants.

Liaison will be maintained for the duration of the project through communications with the USACE Project Manager and/or Engineering Technical Lead. In addition, Nobis will provide a daily update via e-mail to those identified below, and other relevant parties and stakeholders during remedial activities outlining weekly activities, schedule for the following day, and schedule for the following week. A daily synopsis will be provided by Nobis to the building owner/occupant outlining the daily activities, schedule for the following week, and an anticipated schedule noting any changes to keep them informed of the process and assist them with their personal schedules. Nobis will consult with the building owner/occupant to determine how this synopsis will be delivered in the event that they are not present at the end of the day's activities. In the event that there is more than one family/tenant occupying a building, a daily synopsis will be provided to each family/tenant.

Every week, Nobis will organize a telephone conference with USACE, EPA, and MADEP to discuss the status of work and other relevant topics.

A list of primary liaison contact information is provided below.

Primary Liaison Contact Information

Contact	Phone	E-mail
USACE		
KC Mitkevicius	(978) 318-8002	k.c.mitkevicius@usace.army.mil
Peter Hugh	(978) 318-8452	peter.hugh@usace.army.mil
Raushanah Muhammad	(978) 318-8478	raushanah.m.muhammad@usace.army.mil
EPA		
Jim DiLorenzo	(617) 918-1247	dilorenzo.jim@epa.gov
Jim Murphy	(617) 918-1028	murphy.jim@epa.gov
MADEP		
Dave Buckley	(617) 556-1184	david.buckley@state.ma.us
Nobis Engineering		
Michael Bradbury	(603) 224-4182	mbradbury@nobisengineering.com
Kurt Jelinek	(603) 224-4182	kjelinek@nobisengineering.com
Amy Adams	(978) 683-0891	aadams@nobisengineering.com

All questions, submissions and other correspondence shall be directed to the USACE for necessary action. Meetings and conferences initiated by the USACE or other Agencies shall be held only with the approval of, and in the presence of, the USACE. A Memorandum for the Record (MFR) of the matters discussed during the meetings and conferences regarding the project will be prepared and type written by USACE and forwarded to participants or applicable stakeholders within 7 calendar days. All on-site activities shall be coordinated through the USACE. Nobis will notify the USACE prior to initiating any on-site work.

Reports and data generated under this contract shall become the property of the Government and distribution to any other source unless authorized by the USACE is prohibited. Nobis shall not make available to the news media, regulatory agencies or publicly disclose any information pertaining to this contract without prior approval of the USACE. When approached by the above parties, Nobis shall refer them to the USACE for response.

4.0 REGULATORY AND PERMITTING REQUIREMENTS

This Section addresses the regulatory and permitting requirements.

4.1 Applicable or Relevant and Appropriate Requirements

Nobis will conduct remedial activities in accordance with the identified ARARs as stated in the ROD. The following regulatory requirements are generally applicable to the vapor mitigation phase of the OU II Interim Remedy.

4.1.1 Federal Requirements

Occupational Safety and Health Administration (OSHA) Standards 29 CFR 1910.120 and 1926.65 - Nobis and subcontractors will comply with all OSHA requirements applicable to the work to be performed under this Delivery Order. Site-specific health and safety measures to be implemented under this Delivery Order will be detailed in the SSHSP. The SSHSP will be developed in accordance with OSHA Standards 29 CFR 1910.120 and 1926.65, USACE Engineering Manual 385-1-1, the Statement of Work dated December 21, 2006, and the Conceptual Design for Vapor Mitigation Systems prepared by ICF International (ICF, 2006).

Clean Air Act (CAA) National Air Quality Standards for Total Suspended Particulates 40 CFR 50 – specifies maximum primary and secondary 24 hour concentrations for particulate matter. Engineering controls, such as using a vacuum instead of sweeping, will be implemented as necessary to prevent fugitive dust creation during the removal of debris from basement floors.

4.1.2 State Requirements

Massachusetts Ambient Air Quality Standards 310 Code of Massachusetts Regulations (CMR) 6.00 - specifies maximum primary and secondary 24 hour concentrations for particulate matter. Engineering controls will be implemented as necessary to prevent fugitive dust creation during construction activities.

4.2 Additional State and Local Requirements

Nobis and its subcontractors will conform to all state and local regulations pertaining to building, electrical, and plumbing/gas codes as outlined in the Town of Ashland's bylaws titled the *Code of the Town of Ashland, Massachusetts, v8 updated November 30, 2006* (Ashland, 2006). According to the Town of Ashland's bylaws, building construction, electrical work, and plumbing/gas work are regulated by the State of Massachusetts. The following is a summary of the State of Massachusetts applicable regulations:

- Building Code
  - 780 CMR - State Board of Building Regulations and Standards: Building Code
  - Massachusetts General Laws (M.G.L.) Chapter 143 - Inspection and Regulation of, and Licenses for, Buildings, Elevators, and Cinematographs
- Electrical Code
  - 527 CMR 12.00 - Board of Fire Prevention Regulations: Massachusetts Electrical Code
  - M.G.L. Chapter 143, Section 3L - Inspection and Regulation of, and Licenses for, Buildings, Elevators, and Cinematographs: Regulations relative to electrical wiring and fixtures; notice of electrical installation.
- Plumbing/Gas Code
  - 248 CMR - Plumbers and Gas Fitters
  - 527 CMR 6.00 - Board of Fire Prevention Regulations: Liquefied Petroleum Gas Containers and Systems
  - M.G.L. Chapter 142, Section 13 - Supervision of Plumbing: Regulations
  - National Fire Protection Agency (NFPA) 54 – National Fuel Gas Code

4.3 Asbestos Federal and State Requirements

The following are the regulations applicable to asbestos abatement.

4.3.1 Federal Requirements

The asbestos abatement will be conducted in accordance with the EPA Title 40 Code of Federal Regulations Part 61 (40 CFR 61), "National Emissions Standard for Hazardous Air Pollutants" (NESHAP) standard and the OSHA 29 CFR 126.1101, "Construction Standard" and the USACE CEGS-02080, Guide for Military Construction, Section 02080 ("Asbestos Abatement").

4.3.2 State Requirements

The asbestos abatement will be conducted in accordance with the Commonwealth of Massachusetts Department of Labor and Workforce Development Chapter 453, Section 6.00 of the Code of Massachusetts Regulations (453 CMR 6.00), "The Removal, Containment or Encapsulation of Asbestos"; and the MADEP 310 CMR 7.15 "Air Pollution Control Regulations", 310 CMR 18.00 and 19.00, "Solid Waste Regulations".

4.4 Permits

Permits will be obtained from the appropriate town offices for each property for all building, electrical, and plumbing/gas activities planned for the completion of the vapor mitigation system installation. Any applicable fees will be paid in order to obtain said permits.

5.0 QUALITY CONTROL

Quality Control measures will be implemented for construction aspects of the project. Quality Control practices will include CQC for construction tasks.

A letter of transmittal to the USACE for each submission that is made shall include a certification that the submission has been subjected to Nobis' review prior to submittal. Internal review shall be performed to insure:

- completeness for each discipline commensurate with the level of effort required for that submission;
- elimination of conflicts, errors and omissions; and
- the overall professional and technical accuracy of the submission.

5.1 Contractor Quality Control Program

The purpose of the CQC Program is to document the policies and procedures of Nobis to ensure that all items of work conform to the contract specifications with respect to materials, workmanship, construction, components and, operating systems required by this project. This will be accomplished by inspection, surveillance, and testing.

The CQC Program will provide a daily report of work performed, and will establish a detailed record of tests, inspections, certification of compliance and deficiency reports, and corrective actions for current and future reference by Nobis and the USACE. The CQC System Manager will maintain a direct line of communication with the Delivery Order Manager to ensure that the contents of this CQC Program are interpreted and carried out in a professional manner.

Compliance with the requirements of this program is binding upon all Nobis personnel, subcontractors and suppliers involved in the project.

5.1.1 Definable Features of Work

The key construction activities for this project include the following definable features of work for each home (Section 7.0):

- Site Mobilization (Section 7.2)
- Property Storage (Section 7.4.3)
- Sealing of Vapor Entry Routes (Section 7.4.5)
- Diagnostic Testing (Section 7.4.6)
- Vapor Mitigation System Installation (Section 7.5)
- System Startup and Optimization (Section 7.6)
- Backdrafting Evaluation (Section 7.7)
- Code Enforcement Inspection (Section 7.8)
- Site Restoration (Section 7.9)

The Three Phase Inspection (Section 5.1.3) will be completed once for each building including all definable features of work in one preparatory, one initial, and one final inspection.

5.1.2 Technical Submittals

Technical submittals required by the Work Plan will be obtained, reviewed for compliance, and submitted using the designated USACE submittal form for tracking purposes (Appendix A). The CQC System Manager or designee, as appropriate for the type of review, will review technical submittals for adherence to the work plan for the project, as applicable. Submittals reviewed will receive a Submittal Review stamp documenting the results of review, date of review, and signature of the Nobis CQC personnel performing the review. Submittals accepted by the CQC System Manager will be forwarded to the USACE for approval, as applicable. Proposed technical submittal dates will be added to the planning register in accordance with the project schedule to allow required time for USACE review and approval. The submittal tracking ledger will be updated as submittals are sent and responses received from the USACE reviewers.

5.1.3 Three Phase Inspection Control and Procedures

The CQC System Manager will be responsible for implementing the Three Phase Inspection System to ensure that all work and materials, including that of subcontractors and suppliers, complies with all contract requirements.

General inspections will be performed in accordance with the Three Phase Inspection System as follows:

5.1.3.1 Preparatory Inspection

Prior to the beginning of construction activities at each building, the CQC System Manager will schedule a meeting with responsible parties who will perform the work, the Site Safety Officer, and the USACE representative, to discuss the construction specifications and any related safety concerns. A copy of the Preparatory Inspection Checklist is included in Appendix A. Preparatory inspections will include a review of the following:

- A review of contract specifications and requirements.
- A check to assure that required control testing will be provided when necessary.
- A physical examination of equipment, materials and miscellaneous items assuring they have arrived on time, conform to approved shop drawings, and are properly stored upon arrival.
- Examination of work areas to assure that all required preliminary work has been completed assuring contract compliance and compatibility.
- A review of hazards typically encountered for that portion of the work.
- Discuss construction procedures for work to be performed and verify acceptance by the USACE Contracting Officer.
- The USACE Contracting Officer shall be notified at least 48 hours in advance of each identifiable feature of work. Meetings will be held at the discretion of the USACE Contracting Officer.

5.1.3.2 Initial/Follow-up Inspections

An initial inspection shall be performed at the beginning of construction activities for each building. The initial inspection meeting will be held by the CQC System Manager with responsible parties performing the work, the SHSO, and the USACE representative to compare the initial product with contract specifications, discuss deficiencies and other concerns regarding the current phase of work. Results of this inspection shall be documented in the Daily Quality Control Report (Appendix A). Initial inspection shall include a review of the following:

- Preliminary work is in compliance with approved contract requirements.
- Inspection of scheduled performance tests.
- Examination of the quality of workmanship.
- Review of test results.
- Approval or rejection of the initial segment of the work.

Once work is in progress, follow-up inspections will be performed on a daily basis by the CQC System Manager or designee to verify that all control testing is being performed, that the workmanship is in compliance with the project documents, that all deficiencies are being identified and corrected, and that the quality of ongoing work matches that which was agreed upon during the initial inspection meeting. He/she will also obtain quantities of completed and acceptable work. The CQC System Manager or designee will record the results of this inspection in the Daily Quality Control Report. Copies of the Initial and Follow-up Inspection checklists are attached in Appendix A.

5.1.3.3 Completion Inspection

At the completion of all work or significant increment established by the contract specifications, the CQC System Manager shall conduct an inspection of work and develop a "punch list" of items that do not conform to the approved plans and specifications. The list shall include the estimated date by which the deficiency will be corrected. The punch list shall be attached to the Daily Quality Control Report. The CQC System Manager shall make a second inspection to ascertain that all deficiencies have been corrected.

5.1.4 Test Requirements

At each of the 39 structures, system startup testing will be performed after the installation of the vapor mitigation system. Testing procedures are outlined in Section 7.6. Test results will be documented on Daily CQC Forms (Appendix A).

5.1.5 Documents and Records

The CQC System Manager will be responsible for the control and dissemination of project documents including drawings, specifications, amendments, modifications, and daily reports.

The inspection and testing records for this project shall provide objective evidence that the activity being reported conforms to the specific requirements of the contract documents. As a minimum, the following information shall be documented on each quality inspection report, with enough details to allow tracking:

A. Project Title
B. Location
C. Job Number
D. Date
E. Trade Contract Number and Title
F. Trade Contractor
G. The item or activity being inspected
H. Location of item or activity
I. Details of inspection, shall state the actual conditions present at time of inspection
J. Statement that the item or activity is "Acceptable" or "Unacceptable"

Additional requirements of contract specifications, local authorities, and regulating agencies will be adhered to as necessary.

A CQC Report summarizing the daily construction activities will be completed by the CQC System Manager (or alternate) on a daily basis. CQC Reports will include, at a minimum, the following:

- Current construction activities being performed.
- QC Inspections performed, including results.
- Defects and/or non-conformities and proposed corrective actions.
- Corrective actions taken.
- Project delays encountered and anticipated.
- Materials received/accepted on-site.
- Labor and equipment on-site/hours in use.

A copy of the Daily CQC Report Form is included in Appendix A.

5.1.6 Deficiency Identification and Tracking

The CQC System Manager shall be responsible for the control and maintenance of the Deficiency/Corrective Action System. It is noted that while this section utilizes terms and titles

that allude to only inspection personnel being responsible for identification and prevention of deficiencies, this is done only for editorial continuity; rather, all Nobis personnel and Nobis subcontractors shall be responsible for identification of any deficient condition.

Deficient conditions found during Quality Control Inspections shall be reported verbally to the CQC System Manager. The condition shall be promptly investigated and, if verified, the appropriate party shall be directed to correct the deficiency. Correction of the deficiency shall commence immediately and, if possible, completed by the end of the workday or shift.

During inspection of on going work, items found to be deficient without any sign or indication of corrective action being taken shall be documented in a Quality Control Deficiency Report, which summarizes the deficiency. The Quality Control Deficiency Report shall describe the deficiency, identify the responsible party, and describe the cause of the deficiency and description of corrective actions required.

All deficiencies will also be recorded on the Daily CQC Report by the CQC System Manager under Results of Surveillance. Deficiencies reported during the course of construction will be tracked on a project Deficiencies Tracking List included in Appendix A. Deficiencies will be added to the tracking list as discovered with the date of discovery and the date of accepted corrective action. The tracking list will be submitted to the USACE with Daily CQC Reports.

5.1.7 Resident Management System

The Government module of the Resident Management System (RMS) is the automated construction management/quality assurance information system that will be used for monitoring and administration of the contract. Nobis will use the Government furnished Quality Control System (QCS) module of RMS to record, maintain, and submit information throughout the contract period. The Unified Facilities Guide Specification is the guide specification outlining the requirements of the QCS for contract monitoring and administration. The joint use of RMS and QCS facilitates construction planning, contract administration, quality assurance, payments, correspondence, submittal management, safety and accident administration, modification processing, and management reporting.

6.0 HEALTH AND SAFETY

All work performed throughout the project will be performed in a manner that ensures the implementation of safety controls to protect people performing the work, authorized site visitors, and the general public. Establishment of project safety controls will be outlined in the SSHSP to be prepared in accordance with the USACE Safety and Health Manual, EM 385-1-1 (USACE, November 2003) and applicable regulations of the OSHA. The project SSHSP will be submitted under separate cover.

7.0 VAPOR MITIGATION WORK PLAN

The Vapor Mitigation Work Plan involves the design and installation of 41 vapor mitigation systems in 39 residential or public structures. The design and installation will be completed in accordance with the MADEP Guidelines for the Design, Installation, and Operation of Sub-slab Depressurization Systems (MADEP, 2006), American Society of Testing and materials (ASTM) E-2121-03 Standard for Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings (ASTM, 2003) [supersedes the EPA Radon Mitigation Standards dated

February 2003], and ICF's Conceptual Design for Vapor Mitigation Systems (ICF, 2006). Refer to Figures 2 and 3 for limits of the proposed vapor mitigation area.

7.1 Property Access

The EPA obtained site access agreements from the 39 building owners in 2006. These site agreements allow the EPA and associated subcontractors access to the properties for the purpose of the remedial activities outlined in this work plan.

A meeting will be established with each building owner and/or occupant prior to the commencement of construction related activities to communicate the scope of work at their property and discuss scheduling. Meetings with building owners and/or occupants may be required during non-regular business hours (nights and/or weekends) based on the schedule of the building owner/occupant. During this meeting, the building owner and/or occupant can communicate any known conflicts with their personal schedule. In addition, a brief visual inspection of suspect asbestos containing materials (ACM) will be conducted to assess the need for sampling and/or abatement (Section 7.4.4). A follow-up letter will be sent to each building owner prior to the start of remedial activities stating when construction related activities will begin, estimated date of commencement of work on their property, and that contact will be established again approximately two to three weeks before work is to begin on their property.

Building owners and/or occupants will be given a one-week notice at a minimum prior to the need to access the property. The same notice will be given when scheduling a meeting with the building owner and/or occupant. These notices will consist of a written and verbal correspondence. Refer to Section 7.3.2 for specific activities at each property that will require scheduling with the building owner and/or occupant to access the property. In the event that contact is not established with the building owner and/or occupant prior to the date requested, a written notice will be mailed with an alternative date. Due to a need to shift the scheduling to keep work moving forward, the alternative date may or may not be around the same time as the original date.

Nobis and its subcontractors will access each building's basement from the exterior of the building (bulkhead, exterior door) whenever possible. If no exterior entrance exists, the interior access will need to be utilized. Nobis will coordinate with the building owner/occupant to determine the best method of access for both parties when an exterior entrance is not available.

7.2 Mobilization and Work Area Preparation Plan

The vapor mitigation system installation activities include at least two distinct types of mobilization as follows:

1. Mobilization for work area preparation
2. Mobilization at each property

The general requirements of each of the types of mobilizations are described in more detail below.

7.2.1 Mobilization for Work Area Preparation

Nobis will mobilize appropriate equipment and personnel to complete each definable feature of work, as necessary. Local office space shall be secured or a site trailer will be mobilized to act as a temporary field office for the duration of the remedial activities. Temporary electric service

will be installed to provide power during remedial activities. A connex box will be mobilized for storage of equipment, chemicals, health and safety materials, and emergency response spill materials. A dumpster or other applicable container will be delivered for disposal of refuse and waste materials generated during remedial activities. Two portable toilets (men's and women's) will be delivered to serve as the Site's restrooms. Site personnel will not use the restrooms in residences. A temporary chain link fence with privacy slats will be installed around the staging area to ensure a secure office space and secure storage of construction materials.

7.2.2 Mobilization at Each Property

Nobis will mobilize only the equipment and materials needed to complete the remedial activities at the property. The equipment and materials will remain staged at that property for the duration of activities (approximately one week). All other required staging will occur at the site office. Construction debris generated at the property will be disposed of in a dumpster located at the site office.

7.3 Sequencing of Remedial Activities

Sequencing of the remedial activities will require two forms of sequencing: 1) the order in which the properties will be completed; and 2) the order in which the remedial activities will be performed at each property.

7.3.1 Sequence of Properties

The remedial activities will take place over approximately 15 weeks (April 2007 through July 2007). It is anticipated that it will take on average one week per property to complete the activities and that approximately four properties will be completed per week, after project ramp up. The sequence in which the properties will be completed is outlined below. Property designations were determined by the USACE and/or the EPA and are used to maintain confidentiality. Refer to Figure 3 for property locations.

Anticipated Property Sequencing

Week	Property/Activity
Week 1 through 3	Site Preparation, Mobilization, Property Access
Week 4	Properties 24 & 26
Week 5	Properties 18, 21 & 23
Week 6	Properties 34, 37, 39 & 40
Week 7	Properties 10, 35, 36 & 38
Week 8	Properties 13, 17, 19 & 20
Week 9	Properties 22 (3 systems) & 25
Week 10	Properties 27, 28, 29 & 30
Week 11	Properties 8, 31, 32 & 33
Week 12	Properties 6, 7A, 7B & 9
Week 13	Properties 2, 3, 4 & 5
Week 14	Properties 14, 15, 16 & B
Week 15	Site Restoration, Demobilization

The sequencing of the properties and/or duration of construction activities is subject to change based on confined space issues, property access, and scheduling with the building owner and/or occupant.

7.3.2 Sequence of Work

The remedial activities to be completed at each property will be conducted in the following sequence and are described in further detail in Sections 7.4 through 7.10:

1. Pre-Construction Meeting/Inspection (Section 7.4.2)
2. Property Storage (Section 7.4.3)
3. Sealing of Vapor Entry Points (Section 7.4.5)
4. Diagnostic Testing (Section 7.4.6)
5. Vapor Mitigation System Installation (Section 7.5)
6. Electrical Work (Section 7.5.6)
7. System Startup and Optimization (Section 7.6)
8. Backdrafting Evaluation (Section 7.7)
9. Code Enforcement Inspection (Section 7.8)
10. Site Restoration (Section 7.9)
11. Post-Construction Meeting (Section 7.10)

Additional activities in Section 7.4 such as property, storage, suspect ACM sampling and abatement, and sealing of vapor entry routes will be performed on an as needed basis. Refer to Table 1 and the specific property sketches in Appendix B for a detailed synopsis of construction activities.

7.4 Preparatory Work

Prior to design and installation, a series of preparatory work will need to be conducted to provide information for the design. Preparatory work includes a survey and inspection of each property, sealing of possible vapor entry routes, and diagnostic testing. These three aspects of the preparatory work are described below in further detail.

7.4.1 Survey and Inspection

A survey and inspection needs to be conducted to obtain building information that will be utilized in the design and installation of the vapor mitigation system for a specific building. Site surveys and inspections were completed by the USACE, EPA, and MADEP between October 3 and 28, 2006.

7.4.2 Pre-Construction Meeting/Inspection

Nobis will conduct a pre-construction meeting with the building owner and/or occupant, USACE, EPA, and MADEP approximately one week prior to the commencement of work at their property to inform the owner/occupant of the work that will be performed, any health and safety issues that concern them, and to address any questions or concerns they have. Nobis and its subcontractors will also be present at this time so that they can observe field conditions prior to the start of work. This meeting will also serve as the preparatory inspection. Building owners and/or occupants will be notified of this meeting in accordance with Section 7.1.

In addition to the pre-construction meeting, a pre-construction survey will be performed at the same time to document the conditions of the exterior and interior of the building and contents

using video and digital cameras. A similar inspection will be conducted at the completion of work (Section 7.10).

7.4.3 Property Storage

Items stored in the basements will need to be rearranged or removed prior to the start of work to allow access to the basement floor, walls, and crawlspaces. For basements that have a concrete or partial concrete floor, items can be moved within the basement to allow access. Items will be removed from the basement if the quantity of items is substantial and rearranging is not an option. For basements that require the installation of a new concrete floor, items will need to be removed from the basement. Refer to Table 1 for a listing of the properties that are assumed to require removal of the basement contents.

Building owners/occupants will be highly encouraged to remove and/or rearrange items stored in the basement prior to the start of construction activities. Otherwise, a professional mover will be retained to move the items in the basement and relocate them to a temporary storage unit such as a Pod® that will be located on the property. The storage unit will be located on a paved area where it will not block parking or access to the building whenever possible. Should the unit need to be placed on the lawn, the lawn will be restored after removing the unit (Section 7.9). The building owner/occupant will be consulted about the location of the storage unit. If there is more than one tenant at a property, tenants will have their own storage unit. In the event that there is no space to place one or multiple storage units at a property, then items will be moved to the storage unit and the unit will be staged at the site office. The building owner and/or occupant will be given the opportunity to be present during the removal of their belongings. All copies of the key to the storage unit will be handed over to the owner of the contents and will be collected from the owner when the contents are returned to the basement.

Nobis will document all items removed and returned to the basement as well as their condition in writing and with a video and/or digital camera. Items will be placed back where they came from in the basement to the greatest extent possible, unless otherwise instructed by the building owner and/or occupant.

7.4.4 Asbestos Sampling and Abatement

Thermal pipe and boiler insulation as well as asphalt roofing (Property B) are present in some of the buildings where remedial activities are to be performed. These materials are suspected to be ACM. If their location interferes with completing the work, there may be a need to sample the suspect ACM to confirm whether the material is asbestos. Asbestos samples will be collected by an Asbestos Hazard Emergency Response Act (AHERA) accredited and Massachusetts licensed Asbestos Inspector. The need for sampling will be based on observed field conditions at each affected location. Refer to Table 1 for a listing of properties where suspect ACM has been identified. In the event that there is ACM interfering with work activities, abatement of the asbestos may be necessary. Abatement will be conducted in accordance with Section 4.3.

Thermal pipe and boiler insulation will be enclosed in 6-mil polyethylene sheeting to protect the insulation as well as the workers from potential contact. Many basements have low ceilings (less than 6 feet) and the probability of contact with the pipes is high. The boiler will only be enclosed if it is not in use. If the boiler is in use, a barrier (construction tape, road cones, etc.) will be erected around the boiler to prohibit access to that area.

7.4.5 Sealing of Vapor Entry Points

For buildings with foundation cracks, joints, and other possible vapor entry routes such as sumps and floor drains, repair work will need to be conducted to seal these entry routes prior to the diagnostic testing (Section 7.4.6). Refer to Appendix C for material specification sheets for the major components used in sealing the vapor entry points.

7.4.5.1 Small Cracks and Joints

Accessible cracks and joints up to approximately $1/8^{th}$ inch in width and/or depth will be sealed with an elastomeric sealant or similar material that is specifically designed to seal concrete. In addition, the sealant will have low odor, low VOC content (less than 100 grams VOCs per liter), and contain no ingredients known to cause cancer, birth defects, or other reproductive harm. Surfaces to be sealed will be cleaned, dried, and free of soil, decomposed concrete, dust, grease and debris prior to sealing. The sealant will be applied according to the manufacturer's instructions.

The elastomeric sealant will be used on the foundation wall and floor cracks, the floor/wall joint, new concrete and existing concrete joints, voids around utility penetrations, and other small voids that require sealing. Refer to Table 1 for a listing of the specific properties where small cracks and joints were observed.

7.4.5.2 Large Cracks and Joints

Accessible cracks and joints larger than approximately $1/8^{th}$ inch in width and/or depth will be sealed with foam backer rod or other comparable filler material, when appropriate, and a non-shrinking cementitious material, hydraulic cement, or similar material. The foam backer rod and cementitious material will be applied according to the manufacturer's instructions.

The foam backer and non-shrinking cementitious material will be used on large foundation wall and floor cracks, voids around utility penetrations, and other large voids that require sealing. If utility connections such as sewer and/or water lines penetrate the basement floor, a concrete collar across the pipe bedding may be required at the exterior basement wall where the pipes enter the basement sub-grade. The collar will be at least 6 inches thick and will extend at least 6 inches beyond the pipe bedding material. Refer to Table 1 for a listing of the specific properties where large cracks and joints were observed.

In buildings where there are numerous small and large cracks and joints covering a stonewall foundation or are otherwise not amenable to sealing, a parge coating will be applied to the stonewall. Refer to Table 1 for a listing of the specific properties where parge coating has been anticipated for sealing foundation cracks and joints. In some cases where cracks and joints were not quantified, it was assumed that a parge coat will be necessary.

The method of sealing all cracks and joints, large or small, may be modified based on field conditions at the time of remedial activities. Where finished basement walls or other obstructions blocking access to the walls exist, diagnostic testing (Section 7.4.6) will be conducted before removing these structures. If the diagnostic testing results in the proper pressure differential, activities will proceed to the installation of the vapor mitigation system. If the diagnostic testing fails to produce the proper pressure differential, the finished walls and obstructions will need to be removed to seal any cracks and/or joints present in the wall. The diagnostic testing will be performed a second time in these instances to confirm the seal.

7.4.5.3 Sumps

Those properties that currently have a sump in the basement will have the sump upgraded with a new ejector type pit pump. This may require enlarging the current sump pit to fit the pump. If there is an issue of flooding in the basement and there is no sump currently present, a sump will be installed with the ejector type pit pump. The pumps will be installed according to the manufacturer's recommendations. Refer to Table 1 for a listing of specific properties where an ejector type pit pump is expected to be required.

Drainage sumps will be covered with a lid constructed of clear Plexiglas that produces an airtight seal. The clear lid will allow for inspection of the sump without its removal. The lid as well as any penetrations for electrical wiring and water ejection piping will be sealed using silicone caulking, other non permanent type caulking, air tight gasket and mechanical fasteners so that it can easily be removed for sump pump servicing. A waterproof, durable warning label will be applied to the lid indicating the owner and/or tenant must keep the cover tightly closed for safe and proper operation of the vapor mitigation system.

Water from the new sump will be discharged in the same manner that the sump was discharged prior to the upgrade.

7.4.5.4 Floor Drains

Floor drains that are not in use will be sealed with concrete or grout with the permission of the building owner and when no previous history of basement flooding has been provided by the owner. Floor drains that need to be maintained due to current use to control flooding and do not have an acceptable water trap will be retrofitted with a Dranjer (Figure 4). Refer to Table 1 for a listing of specific properties that require the installation of a Dranjer.

7.4.5.5 Earthen Floors and Crawlspaces

For buildings with full or partial earthen floors in the basement, the floor will be sealed with a 3.5-inch 3,000 pounds per square inch (psi) thick concrete floor. In order to maintain the headspace in the basement, approximately 3-inches of soil will be removed and disposed of at an unlined landfill prior to the installation where necessary. The soil will be characterized according to MADEP Policy #COMM-97-001 (Reuse and Disposal of Contaminated Soil at Massachusetts Landfills). The weight bearing columns will be embedded in the concrete. The columns will be coated with a protective sealant such as an epoxy paint or bituminous coating. The concrete floor will be allowed to cure for a minimum of 48 hours prior to the diagnostic testing (Section 7.4.6). The joint between new and existing concrete floors will be sealed with an elastomeric sealant or similar material.

Crawlspaces that have earthen floors will be sealed with a 6-mil Class A or B membrane. Where crawlspaces are utilized for storage, poured concrete will be used to seal the crawlspace. If poured concrete is not a feasible option, a protective barrier will be placed over the Class A or B membrane. Any occupied space that is situated over a fully ventilated crawlspace will be sealed on the underside of the structure with foil backed insulation provided that this space was not insulated in the past. The joints will be sealed with tape. Refer to Table 1 for a listing of specific properties that have crawlspaces and the specific property sketches in Appendix B.

Property No. 15 is problematic due to a very irregular surface and numerous heavy boulders. An alternative spray-on application consisting of Liquid-Boot© will be further evaluated during the sub-contractor negotiations.

7.4.6 Diagnostic Testing for Floor Slabs

Diagnostic testing will be conducted for buildings with slab on grade or basement concrete floor slabs. The objective of the diagnostic testing is to investigate and evaluate the development of a negative pressure field via the induced movement of soil gases beneath the slab. This information will be used to determine the number and location of needed system extraction points for the design of each vapor mitigation system. The diagnostic testing for each property with a concrete slab floor (Table 1) will be conducted as follows:

- Sub-slab utility piping or conduits and other sub-slab installations will be identified prior to drilling and/or excavation activities.
- One 3.5-inch diameter extraction hole will be drilled approximately 12 inches below grade through the building slab at the proposed location of the mitigation extraction point. The extraction hole will be located near an exterior wall (away from footings) in the side of the building where the riser pipe will be located unless structural, utility, or design constraints do not allow for this. In addition, the location of the extraction point will be dependent on the approval of the building owner and will be placed in the most unobtrusive location possible (utility rooms, closets, etc.). Soil characteristics and whether groundwater is encountered will be recorded.
- Two monitoring holes 5/16 inch in diameter will be drilled approximately 6 inches below grade using a rotary hammer drill. One monitoring hole will be located halfway between the extraction hole and the far end of the area to be served by that extraction point. The other monitoring hole will be located near the far end of the area to be served by that extraction point. Again, these monitoring holes will be placed in the most unobtrusive locations possible. A small diameter tube will be inserted into the monitoring holes, taking care not to extend to the bottom of the holes. The tubing will be sealed in the hole with putty, modeling clay, beeswax, or similar material.
- A Magnehelic® gauge will be installed in the extraction point and each monitoring point to measure the baseline pressure differential between the void space beneath the slab and the air space above the slab. The gauge will be capable of detecting and quantifying a pressure differential of 0.002 inches of water column (WC). It will be verified that the gauges have been zeroed before a vacuum is applied to the extraction point.
- A vacuum will be applied to the extraction hole using a blower apparatus or shop vacuum that can achieve at least 50-inches WC of negative pressure. The discharge from the extraction point will be vented to the outside air.
- The pressure differential in the monitoring holes will be recorded after the application of the vacuum at the extraction hole. A pressure drop of less than 0.016 inches of WC is generally not considered significant (ICF, 2006). If a vacuum of less than 0.002 inches of WC is observed at the monitoring holes (compared to baseline conditions), smoke will be used to determine if a positive downward flow of air is observable at the monitoring holes. The USACE, EPA, and MADEP will be informed if a vacuum of at least 0.002 inches of WC and/or positive downward flow of air is not observed at the monitoring holes before proceeding with the design and installation of the vapor mitigation system.

- Following the test, the extraction hole and monitoring holes will be temporarily sealed with a rubber stopper or cork. Any unused holes will be permanently sealed with Portland cement grout after installation of the final vapor mitigation system.

For larger buildings and buildings with multiple basement areas or construction types (finished and unfinished areas, or full basement, crawl spaces and/or slab areas), the diagnostic testing may require more than one extraction point. This will be assessed in the field prior to the performance of the diagnostic test.

Atmospheric pressure may be of importance where diagnostic testing indicates marginal negative pressure readings. The barometric pressure will be recorded for the day of testing as well as seven days in advance of the testing using a Weather Monitor II®. A trend of rising barometric pressure tends to promote advection of air into the ground, which may be falsely interpreted as a negative pressure field created during diagnostic tests (ICF, 2006). If this concern exists, the test will be repeated during a time of falling barometric pressure.

An initial survey of combustion appliances (oil or gas furnace, water heater, fireplace, wood or coal stove, etc.) in each property that may attribute to backdrafting will be completed during the diagnostic test. A backdrafting evaluation will be conducted after the final installation of the vapor mitigation system (Section 7.7).

Refer to Figure 4 for a layout of a typical diagnostic testing system.

7.5 Vapor Mitigation System Design and Installation

The objective of the vapor mitigation system is to prevent the vapor from entering the building. Two types of systems can be utilized to achieve this objective: active systems and passive systems. An active system collects air from the vadose zone through one or more intake ports and exhausts the air to the outdoors by means of an electric fan. A passive system provides a flow path for air below the basement slab to vent to the atmosphere without any mechanical assistance. The active system has been selected for design and installation at the Site since it is more effective and controllable than the passive system.

Two types of active vapor mitigation systems will be installed considering the types of structures at the Site:

- sub-slab depressurization (SSD) system for concrete slab floors; and
- combination SSD/sub-membrane depressurization (SMD) system for basements with crawlspaces sealed with a membrane.

Buildings with crawlspaces that will be sealed with 6-mil Class A or B membrane during the sealing of vapor entry points (Section 7.4.5) will have a combination SSD/SMD system if there is an extraction point installed in the crawlspace through the membrane. If no extraction points are proposed for the crawlspace, than these properties will strictly have a SSD system. Refer to the specific property sketches in Appendix B for details of the SSD and SMD systems and to distinguish which system will be installed at each property.

Property B currently has a passive vapor mitigation system that was put in place as part of renovations performed in 2004. The system will be tested (Section 7.4.6) to ensure that the system functions properly and will be upgraded to an active SSD system with a fan, monitors and alarms, and properly venting fan discharge pipe. Property B will undergo the same system startup and optimization and backdrafting evaluation as the other properties to ensure that the

upgrades were installed and are functioning properly. A specific property sketch has not been prepared for Property B since a vapor mitigation system has already been installed.

The components and the related design and installation requirements presented below apply to both the SSD and SMD systems unless it is specifically stated. Refer to Appendix C for material specification sheets for the major components of the vapor mitigation system.

7.5.1 Extraction Points

A minimum of one extraction point will be constructed for each property. The number of extraction points for a specific property is subject to change based on the outcome of the diagnostic tests described in Section 7.4.6. Refer to Table 1 for the estimated number of extraction points anticipated per property and the specific property sketches in Appendix B for the proposed location of the extraction points. If it is deemed feasible, the extraction points that were constructed for the diagnostic tests will be used for the final vapor mitigation system. All extraction points for the final system will be located in the most unobtrusive places, especially in buildings with finished basements or slab on grade foundations.

7.5.1.1 Sub-Slab Depressurization System

Extraction points for the SSD systems will be constructed by coring a 3.5-inch diameter hole through the concrete slab. The core will extend to 12 inches below the bottom of the slab. The sub-slab material will be removed via vacuum to create a suction pit approximately 12 inches in diameter. The suction pit will be left void. Washed ½ to 1-inch gravel will be used to backfill the suction pit if it is necessary for structural support or to address high water table concerns. A 3-inch diameter PVC pipe will then be inserted into the top of the suction pit. The pipe will be fitted with a 4-inch coupling directly above the concrete slab to prevent downward movement of the pipe. The annular space between the PVC pipe and the concrete slab will be sealed with non-shrinking cementitious grout.

7.5.1.2 Sub-Membrane Depressurization System with Suction Pit(s)

For crawlspaces with membranes that require an extraction point, the suction pit will be constructed by hand excavating the soil beneath the membrane approximately 12 inches deep and 12 to 24 inches in diameter based on soil conditions. The suction pit will be backfilled with washed ½ to 1-inch gravel. A 3-inch diameter PVC pipe will then be inserted into the top of the suction pit. The pipe will be supported in a manner that prevents downward movement. An adequate seal will be achieved between the membrane and the PVC pipe using an appropriate adhesive and metal hose clamps.

7.5.2 Piping

The system piping will consist of 3-inch diameter, Schedule 40 PVC with threaded or solvent welded connections. Manifold piping for the suction points will be 3-inch diameter PVC. Pipe joints and fittings will be Schedule 40 PVC and sealed permanently with primer and PVC glue. The fan joints will be flexible rubber connections that are suitable for outdoor use.

All horizontal-piping runs will be installed at a slope of 1/8 inch per foot to drain condensate back to the extraction points. The fan discharge pipe will be routed up an exterior wall to 2 feet above the roof line and have an attached 180 degree gooseneck with end screen to prevent inflow of atmospheric precipitation and debris. The termination point will be at least 10 feet above grade and 10 feet from any window, door, operable roof window, air intake, or adjacent

building unless approved in writing by the USACE that it can be placed closer. Refer to the specific property sketches in Appendix B for a system detail and proposed location of the fan discharge pipe.

Piping will be supported every 6 feet on horizontal runs and every 8 feet on vertical runs that do not penetrate floors, ceilings, or roofs. Routing of the piping will be completed with approval from the building owner and in a manner that does not structurally compromise the building. Penetrations between the discrete building spaces and the exterior walls will be sealed by the application of expanding foam in the penetration annulus.

7.5.2.1 Condensation

A condensate bypass will be installed in the outlet ducting to direct condensation formed in the piping back to the extraction points. The bypass will be constructed with a 45 degree Wye fitting at the bottom of the outlet stack. The bottom of the Wye will be capped and fitted with a tube that connects to the inlet piping or other drain. The bypass tubing will be insulated to prevent freezing. Refer to Figure 4 and the specific property sketches in Appendix B for a detail of a typical condensate bypass.

7.5.2.2 Sampling Ports

Two sampling ports will be installed in the system piping to allow for air quality testing. One port will be installed within the basement on a pipe under negative pressure located near an extraction point. The second port will be installed outside the building located directly downstream of the fan discharge.

Each sampling port will be constructed with brass or nylon threaded 3/16th to ¼ inch outer diameter hose barbs drilled and taped into the 3.5-inch PVC piping. Sealant will be used, if necessary, to produce an air tight connection. The hose barb will be equipped with a cap and/or stopcock to prevent leakage from the PVC piping.

7.5.3 Permanent Monitoring Points

Two permanent monitoring points per extraction point will be installed for long term monitoring of pressure fields and soil vapor constituents. One point will be located in the far end of the pressure field and one will be approximately in the middle between the extraction point and the far end point. If it is deemed feasible, the monitoring points will be installed in the same holes used during the diagnostic testing. Otherwise, the monitoring points will be located in the most unobtrusive places. Refer to the specific property sketches in Appendix B for the proposed location of the monitoring points for each property.

7.5.3.1 Sub-Slab Depressurization System

Monitoring points will be installed identical to the diagnostic testing points in Section 7.4.6. To ensure the points will be permanent, a 1-inch diameter hole will be drilled to a depth of 1-inch below the top of slab over the smaller diameter hole. The permanent sub-slab monitoring point will be installed as detailed in Figure 4. Permanent points will be flush mounted with the floor.

7.5.3.2 Sub-Membrane Depressurization System

Monitoring points installed in the crawlspace membranes will be made permanent in a similar manner as the SSD monitoring points as detailed in Figure 4. An adequate seal will be

achieved between the membrane and the tubing using an appropriate adhesive and metal hose clamps.

7.5.4 Fan

One fan will be installed per property unless the diagnostic testing suggests otherwise or if building constraints preclude manifolding extraction points together in series. This fan is rated for continuous duty and outdoor use with a minimum operating range of –20 to 120 degrees Fahrenheit. The fan will be installed outside the building approximately 3 to 5 feet above ground level in line with the discharge piping using removable couplings or flexible connections that can be tightly secured. Sound dampening material such as neoprene or rubber padding and/or a muffler will be installed to reduce the noise and vibration of the fan. Refer to the specific property sketches in Appendix B for a detail of and the proposed location of the fan.

The size of the fan needed for each property will be determined during diagnostic testing. Several different size fans will be stored at the Site office to mitigate project delays.

7.5.5 Monitors and Alarms

A U-gage manometer will be installed at each extraction point in a location that can be easily monitored by the building occupant. The range of the device will be consistent with negative pressure levels at that specific location. The manometer will have clearly marked lines indicating the minimum acceptable vacuum levels. A log sheet will be placed with the manometer for recording periodic verification checks.

A visible "system off" alarm will be installed so that it is activated when there is no vacuum. The visible alarm will have its own power source separate from the fan power source. The alarm will be co-located near the system shut off switch (electrical panel) and labeled accordingly with a contact phone number for the MADEP.

7.5.6 Electrical Requirements

The fan operates on standard 120 volt 60 hertz alternating current (AC) electricity used in residential buildings. Typical power consumption for the fan at 120 volts AC is 45 to 66 watts. The wiring will not be located inside the mitigation system piping or within any other heating or cooling ductwork.

Outdoor electrical connections (cords, plugs, receptacles, receptacle enclosures, switches, switch enclosures, etc.) will have a weatherproof and unattended use rating. For safety, the outside wiring will be hardwired.

In order to meet the electrical requirements of the fan and the manometer alarm, some of the properties may require the installation of either a new electrical panel, split service, and/or a new meter. The circuit breaker controlling the circuits for the fan and the alarm will be labeled using the words "Vapor Fan" and "Vapor Alarm". Refer to Table 1 for a listing of the properties for which electrical requirements are considered necessary.

All wiring and electrical work will be conducted by a Licensed Massachusetts Electrician in accordance with the 2005 National Electrical Code Handbook and the Massachusetts Building Codes.

7.6 System Startup and Optimization

After activating the vapor mitigation system, all system components will be inspected and any needed adjustments or fine tuning will be conducted. The following will be verified:

- proper function of the fan, the manometers, gauges, and alarms;
- achievement of the appropriate vacuum at the extraction point as indicated by the system manometer; and
- achievement of a negative pressure of at least 0.016 inches WC at all monitoring points. A smoke test will be performed where the negative pressure is less than 0.016 inches WC to document the unambiguous downward flow of building air into the sub-slab.

7.7 Backdrafting Evaluation

Once the vapor mitigation system has achieved steady-state operation, a backdrafting evaluation will be conducted to ensure the proper venting of flue gases from all combustion appliances located above the basement or building slab such as an oil or gas furnace, water heater, fireplace, wood or coal stove, etc. The evaluation will be conducted according to the following procedure, which is the procedure outlined in the MADEP Design & Installation Specifications of Sub-slab Depressurization Systems (MADEP, 2006):

- Close all windows and doors, both external and internal.
- Open all heating, ventilating, and air conditioning (HVAC) supply and return air duct vents/registers.
- Close fireplace and wood stove dampers.
- Turn on all exhaust and air distribution fans and combustion appliances except the appliance being tested for backdrafting.
- Wait 5 minutes.
- Test to determine the indoor-outdoor pressure differential in the room where the appliance being tested is located. If the pressure differential is a negative 0.004 inches WC or more, assume that a potential for backdrafting exists.

The equipment needed for the evaluation includes a differential pressure device, an outdoor pressure tube, and an outdoor pressure averaging system.

If a backdrafting potential is identified, the vapor mitigation system will not be operated until a qualified HVAC contractor corrects the drafting issues. A carbon monoxide detector will be installed for each home where backdrafting is a possibility.

7.8 Code Enforcement Inspection

The building, electric, and plumbing/gas inspectors will conduct an inspection of the work completed to ensure that the new construction performed adheres to building, electric, and plumbing/gas codes. Any violations will be rectified prior to demobilizing from the property.

7.9 Site Restoration

Necessary site restoration activities will take place after completion of the remedial activities. The building owner and/or occupant's belongings will be moved back into the basement and the keys will be collected (Section 7.4.3). If any damage to the lawn or pavement occurred with the staging of the temporary storage unit, it will be repaired at this time. The area of the lawn that was affected will be regraded with topsoil and/or seeded, if necessary. Any pavement that was damaged will be repaired with flowable asphalt, cold patch, or other applicable product. Other restorative issues that may arise from the installation of the vapor mitigation system include damage to existing interior items such as wood railings, stairs, door jambs, etc. Any interior damage caused as a result of the installation of the vapor mitigation system will be repaired during site restoration activities.

7.10 Post-Construction Meeting

Nobis will conduct a post-construction meeting with the building owner and/or occupant, USACE, EPA, and MADEP to confirm that remedial activities were completed in accordance with this work plan and the site has been restored to the satisfaction of all stakeholders. It will be at this time that the building owner and/or occupant will receive a Resident's Manual, an information package explaining the building owner/occupant's responsibilities regarding the vapor mitigation system and contact information. The information in the package will be reviewed with the building owner and/or occupant. Building owners and/or occupants will be notified of this meeting in accordance with Section 7.1.

In addition to the post-construction meeting, an inspection of the post-work conditions of the exterior and interior of the building will be documented using video and digital cameras. A punch list of items that need attention will be completed. If there are no punch list items to address, this concludes remedial activities for that structure.

7.11 Operation and Maintenance

An Operation and Maintenance (O&M) Plan will be prepared by the MADEP after the closure of remedial activities outlining system operation, requirements for routine O&M, non-routine O&M, inspections, and monitoring. As-built drawings of each property as well as vendor contact and warranty information for the major system components/materials will be included in the O&M Plan. A copy of the O&M Plan will be provided to the EPA by the MADEP.

REFERENCES

Ashland, 2006. Code of the Town of Ashland, Massachusetts, v8, Town of Ashland, November.

American Society for Testing and Materials, 2003. Standard Practice for Installing Radon Mitigation Systems in Existing Low Rise Residential Buildings, ASTM E-2121-03, February 10.

ICF International, 2005. Final Report, Indoor Air Human Health Risk Assessment, Nyanza Chemical Waste Dump Superfund Site, Operable Unit II, Ashland, Massachusetts, October.

ICF International, 2006. Final Conceptual Design for Vapor Mitigation Systems, Nyanza Chemical Waste Dump Superfund Site, Operable Unit II, Ashland, Massachusetts, December.

Massachusetts Department of Environmental Protection, 1997. Reuse and Disposal of Contaminated Soil at Massachusetts Landfills, Policy # COMM-97-001, August.

Massachusetts Department of Environmental Protection, 2006. Design & Installation Specifications of Sub-slab Depressurization Systems, August.

United States Army Corps of Engineers, 2003. Safety and Health Manual EM 385-1-1, November.

United States Army Corps of Engineers, 2006. Statement of Work for Nyanza Chemical Waste Dump Superfund Site, Operable Unit II, Ashland, Massachusetts, December.

United States Environmental Protection Agency, 1991. EPA Superfund Record of Decision: Nyanza Chemical Waste Dump Superfund Site, EPA ID: MAD990685422, OU 02, Ashland, Massachusetts, September.

United States Environmental Protection Agency, 2006. Explanation of Significant Differences for the Nyanza Chemical Waste Dump Superfund Site (Operable Unit 2), Ashland, Massachusetts, September.

Tables

Table 1
Vapor Mitigation System Requirements Per Property

Operable Unit II Remedial Action
Nyanza Chemical Waste Dump Superfund Site
Ashland, Massachusetts

		Preparatory Work																							
		Basement Access			Property Storage		Sealing of Vapor Entry Routes														Electrical Work				
Property No.	Survey and Inspection	Bulkhead	Exterior Door	Interior Access	Property Storage (Pod)	Rearrange Basement Contents	Small Floor Cracks[1] (linear feet)	Small Wall Cracks[1] (linear feet)	Large Floor Cracks[2] (linear feet)	Large Wall Cracks[2] (linear feet)	Stonewall Voids[2] (>4 inch^2)	Floor/Wall Joint[3] (linear feet)	Utility Penetrations	Full Stonewall Parge Coat[4] (feet^2)	Ejector Type Pit Pump	Install Sump Pit	Sump Cover	Concrete/ Grout Floor Drain	Dranjer	New 3.5-inch Thick Floor Slab (feet^2)	Crawlspace Membrane (feet^2)	Expansion Panel	Split Service	New Meter	Miscellaneous Items of Work	Diagnostic Testing	Extraction Points
2	10/3/2006	1	-	-	-	-	200	-	-	-	12	120	3	-	-	-	-	-	-	35	-	-	-	-	Install 8-inch stovepipe cap over abandoned cold air return.	1	1
3	10/16/2006	1	-	-	-	1	100	-	-	-	-	120	3	2,000	-	-	-	-	-	230	600	-	-	-	Enlarge crawlspace opening due to ductwork.	1	2
4	10/11/2006	1	-	-	-	1	100	100	-	-	-	65	3	-	-	-	-	-	-	200	-	-	-	-	Pull up boards to pour concrete floor.	1	1
5	10/4/2006	1	-	-	1	-	-	-	-	-	-	-	3	475	-	-	-	-	-	1,000	-	1	-	-		1	1
6	10/3/2006	-	1	-	-	1	-	-	-	-	-	50	3	1,600	1	-	1	-	-	1,200	500	-	-	-	Re-route and seal dryer vent hole from first floor with wood. Cut off and seal 2 - 1-inch diameter pipes protruding from wall and floor.	1	3
7A	10/4/2006	1	-	1	4	-	-	-	-	-	-	160	3	975	-	-	-	-	-	-	-	-	1	1	Level of effort for floor sealing unknown.	1	2
7B	10/4/2006	1	-	-	2	-	-	-	-	-	-	-	3	800	1	1	1	-	-	680	-	1	1	1	Fuse panel updated to breakers. Replace wood columns, pour basement floor in sections.	1	1
8	10/17/2006	1	-	-	-	1	120	-	134	-	-	-	3	740	1	-	1	-	-	-	250	-	-	-	Repair bulkhead stairs.	1	2
9	10/6/2006	1	-	-	-	1	100	-	-	-	-	-	3	-	1	-	1	-	-	-	-	-	-	-		1	1
10	10/21/2006	1	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-		-	-	-	Test existing radon mitigation system. Install gooseneck on vent pipe and condensation bypass tube. Suspect ACM has been observed in the basement - wrap in 6-mil polyethylene sheeting. May require sampling and abatement.	1	1
13	10/5/2006	1	-	-	-	1	100	-	-	-	-	30	3	-	2	-	2	-	-	-	-	-	-	-	Seal 20"x20"x2" hole under shower.	1	1
14	10/4/2006	-	-	1	-	1	100	100	-	-	-	-	4	-	1	-	1	1	-	-	310	-	-	-	Crawlspace under addition has difficult access due to low vertical clearance and duct work. Cut off pipes where necessary. Seal 5" x 5" hole that the valve is in.	1	4
15	10/10/2006	-	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	320	-	-	-	Seal basement floor using either a concrete floor slab or spray-on membrane such as Liquid Boot or approved equivalent. Need to determine how to install fan discharge pipe. The basement is completely below grade. Suspect ACM has been observed in the basement - wrap in 6-mil polyethylene sheeting. May require sampling and abatement.	1	3
16	10/5/2006	1	-	-	-	1	200	-	200	-	10	-	3	-	-	-	-	1	-	-	420	-	-	-	Seal 6 holes in concrete floor.	1	2
17	10/7/2007	1	-	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-		1	1
18	10/6/2006	1	-	-	-	1	-	-	10	-	10	-	3	-	-	-	-	-	-	-	-	-	-	-		1	1
19	10/16/2006	1	-	-	-	1	-	-	-	-	-	30	3	850	-	-	-	-	-	90		1	-	-	Suspect ACM has been observed in the basement - wrap in 6-mil polyethylene sheeting. May require sampling and abatement.	1	1
20	10/10/2006	1	-	-	-	1	100	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	1		1	1
21	10/17/2006	1	-	-	-	1	100	-	10	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	Suspect ACM has been observed in the basement - wrap in 6-mil polyethylene sheeting. May require sampling and abatement.	1	1
22	10/21/2006	3	-	-	2	1	300	300	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	Three separate basements requiring three systems.	3	3
23	10/19/2006	1	-	-	2	-	100	-	-	-	-	110	2	-	-	-	-	-	1	-	-	-	-	-	Seal overflow boiler pipe. Suspect ACM has been observed in the basement - wrap in 6-mil polyethylene sheeting. May require sampling and abatement.	1	1
24	10/16/2006	1	-	-	1	-	100	-	-	10	-	-	3	-	-	-	-	-	-	-	233	-	1	1	Crawlspace inaccesible, will need to remove CMU wall to access. No access behind sheetrock walls. Need to remove access to observe and seal wall cracks.	1	1
25	10/14/2006	1	-	-	-	1	100	25	200	50	10	250	3	-	-	-	-	-	-	300	140	1	-	-	Remove rusted pipes from pipe chases in floor. Suspect ACM has been observed in the basement - wrap in 6-mil polyethylene sheeting. May require sampling and abatement.	1	2
26	10/7/2006	1	-	-	-	1	-	100	-	100	-	-	3	-	-	-	-	-	-	-	500	1	-	-	Three crawlspaces present.	1	2
27	10/12/2006	1	-	-	1	-	100	100	-	-	-	300	3	-	-	-	-	-	-	340	-	1	-	-	Work needs to be coordinated with remediation contractor.	1	1
28	10/12/2006	1	-	-	1	-	150	100	-	10	-	90	4	-	-	-	-	-	-	-	144	1	-	-		1	2
29	10/19/2006	1	-	-	-	1	100	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	Seal boiler overflow pipe in floor.	1	1
30	10/14/2006	1	-	-	-	1	-	-	-	5	-	-	2	-	-	-	-	-	-	-	216	1	-	-	Crawl space contains numerous columns. Fieldstone wall in crawl space is severely deteriorated and needs a full parge	1	1
31	10/28/2006	-	1	-	1	-	100	-	-	-	-	150	2	-	-	-	-	-	-	32	220	-	-	-	No work proposed in garage workshop.	1	3
32	10/11/2006	1	1	-	3	-	100	100	-	-	-	214	2	-	-	-	-	-	-	484	-	-	-	-	Remove soil above stonewall in garage to lay concrete slab. Remove and replace finished walls to access wall cracks.	1	1
33	10/11/2006	1	-	-	1	-	100	100	-	-	-	-	2	-	1	1	1	-	-	-	-	1	-	-		1	1
34	10/13/2006	1	-	-	1	-	100	100	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	Remove and replace finished walls to access wall cracks.	1	1
35	10/21/2006	1	-	-	2	-	100	-	-	-	-	120	2	-	-	-	-	-	-	-	-	-	-	-	Remove and replace finished walls to access wall cracks. Excessive clutter	1	1
36	10/13/2006	1	-	-	-	1	20	-	15	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	Seal 3 to 4 inch diameter holes in floor.	1	1
37	10/14/2006	1	-	-	-	1	100	-	-	-	-	-	2	-	1	1	1	-	-	-	80	-	-	-	Repair 8'x4' patch of disintegrated concrete floor.	1	2
38	10/12/2006	1	-	-	-	1	-	-	-	-	-	116	2	-	-	-	-	-	-	-	-	-	-	-		1	1
39	10/28/2006	-	-	1	-	1	100	-	-	-	-	100	3	-	1	-	1	-	-	-	20	-	-	-	Remove and replace finished walls to access wall cracks.	1	2
40	10/28/2006	1	-	-	-	1	100	-	-	-	-	90	3	-	-	-	-	-	-	-	210	1	-	-		1	3
B	10/24/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Perform diagnostic testing on existing vapor mitigation system. Install fan, monitors, and alarms. Extend vent pipes through roof. Assume roofing materials to be asbestos.	1	-
	Totals	35	3	4	24	23	2,990	1,125	569	175	42	2,115	103	7,440	10	3	10	3	2	4,591	4,163	10	4	4		41	60

Notes:
1. Quantities shown are based on estimates collected during the Survey and Inspection on the dates provided above. If no quantity was provided it was assumed to be 100 linear feet.
2. Quantities are estimated from photos and may not reflect actual field conditions.
3. Quantities shown are based on estimates collected during the Survey and Inspection on the dates provided above. If no quantity was provided it was assumed to be the entire perimeter of the building. This quantity also includes the joint between new and existing concrete floors.
4. Quantities shown are based on estimates collected during the Survey and Inspection on the dates provided above. If no quantity was provided, quantities are estimated from photos and may not reflect actual field conditions.
5. ACM is asbestos containing material.

Figures

NORTH

USGS TOPOGRAPHIC MAP

FRAMINGHAM, MASSACHUSETTS

1987

APPROXIMATE SCALE
1 INCH = 25,000 FEET

Nobis

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QUADRANGLE LOCATION

FIGURE 1

LOCUS

NYANZA CHEMICAL WASTE DUMP
SUPERFUND SITE
ASHLAND, MASSACHUSETTS

PROJECT 74060.00

JANUARY 2007

J:\74060 Nyanza Superfund WP\Shop Drawing Sketches\LOCUS.dwg

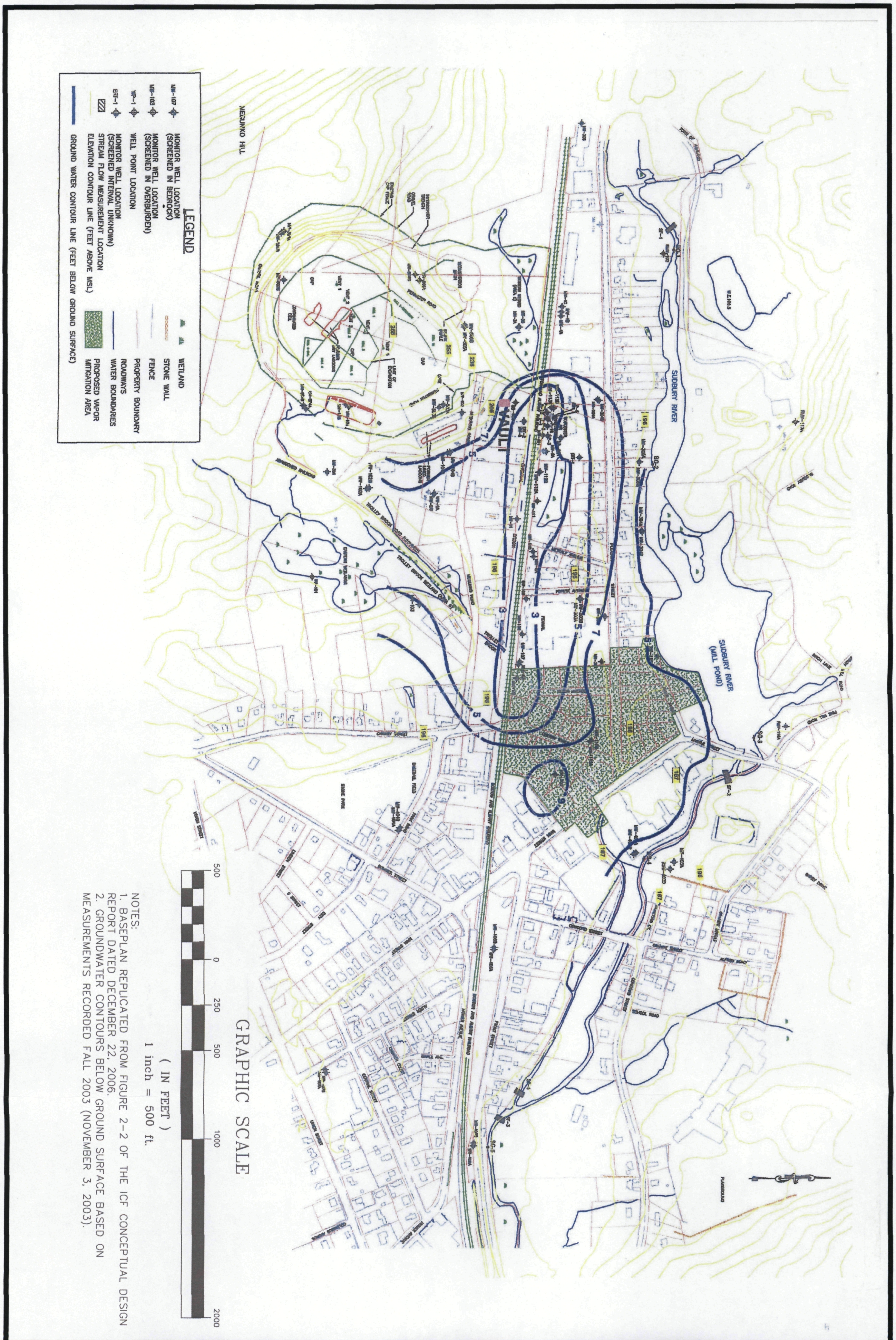
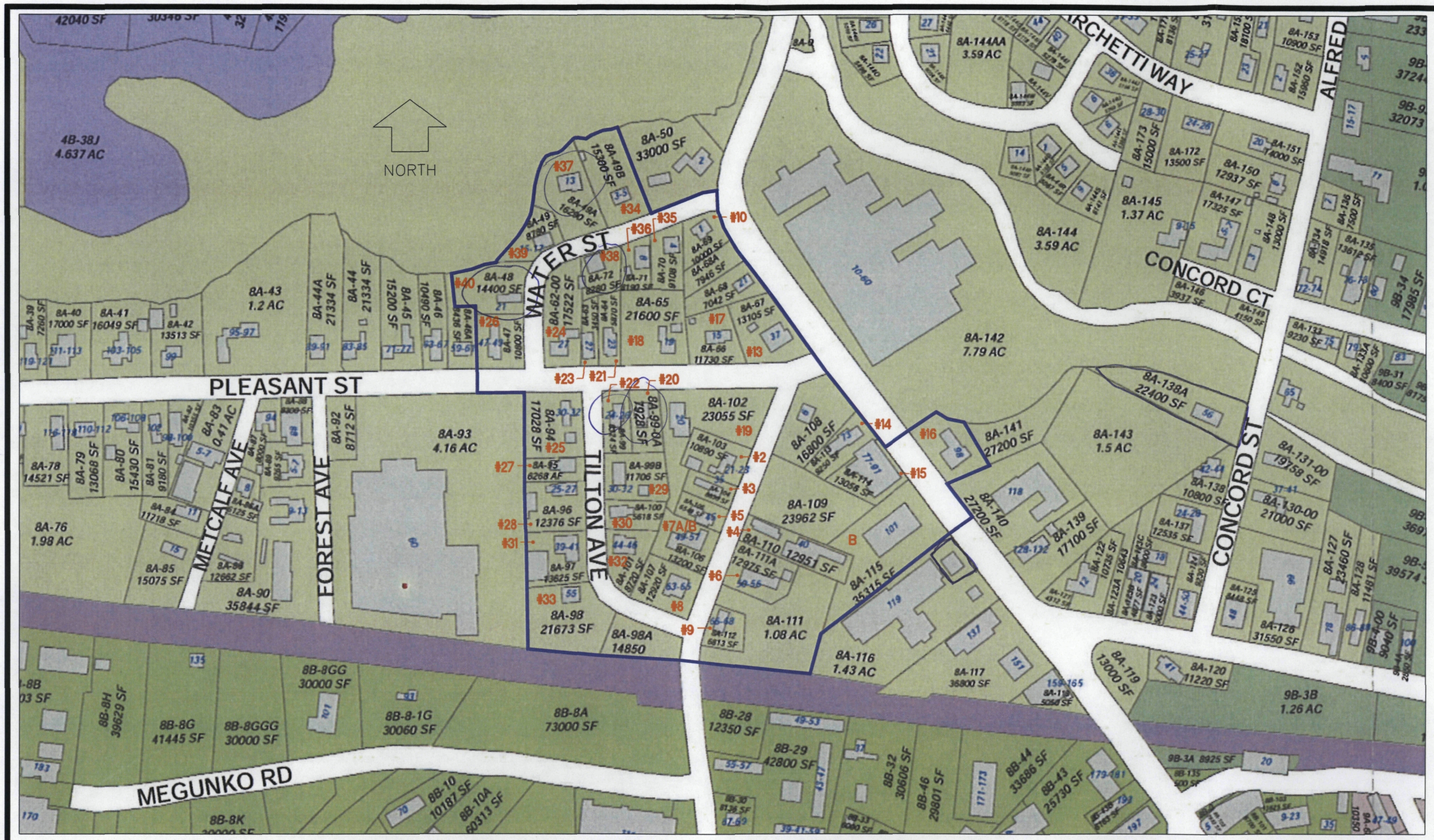


FIGURE 2	NYANZA CHEMICAL WASTE DUMP SUPERFUND SITE ASHLAND, MASSACHUSETTS SITE PLAN	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	US Army Corps of Engineers ® New England District	Nobis NOBIS ENGINEERING, INC. 18 Chenell Drive Concord, New Hampshire 03301	DATE: 1/23/07 PROJECT NO:. 74060 FILE NAME: WORK PLANS SUPERFUND SITE: NYANZA PREPARED BY: AMY ADAMS CHECKED BY: KURT JELINEK



GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

1 inch = 200 ft.

KEY:

#40 PROPERTY #

PROPOSED VAPOR MITIGATION BOUNDARY

NOTES:

1. BASEPLAN REPLICATED FROM TOWN OF ASHLAND TAX ASSESSORS MAP#8.

DATE: 1/23/07
PROJECT NO.: 74060
FILE NAME: WORK PLANS
SUPERFUND SITE: NYANZA
PREPARED BY: AMY ADAMS
CHECKED BY: KURT JELINEK

Nobis
NOBIS ENGINEERING, INC.
18 Chenell Drive
Concord, New Hampshire
03301

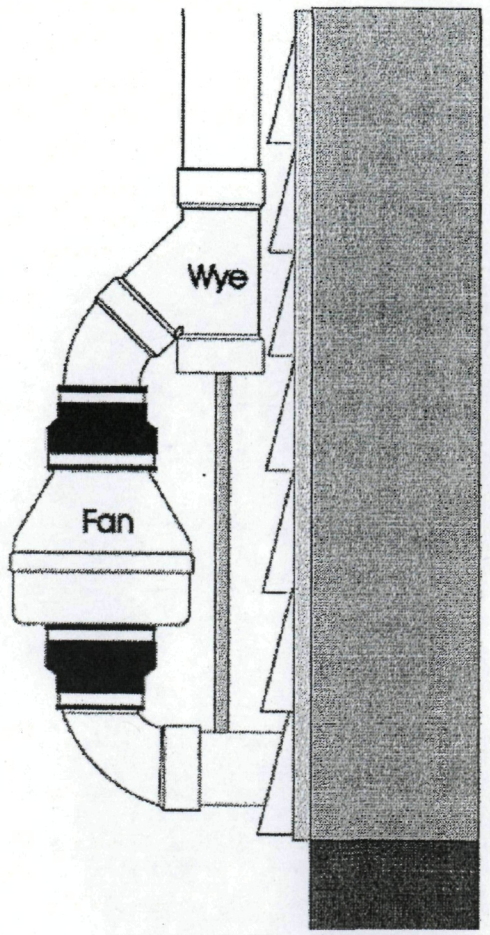
US Army Corps of Engineers ®
New England District

UNITED STATES • ENVIRONMENTAL PROTECTION AGENCY

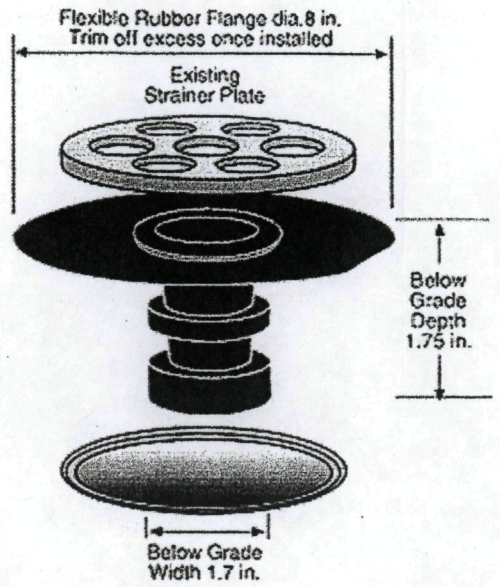
NYANZA CHEMICAL WASTE DUMP
SUPERFUND SITE
ASHLAND, MASSACHUSETTS

PROPERTY LOCATIONS

FIGURE 3

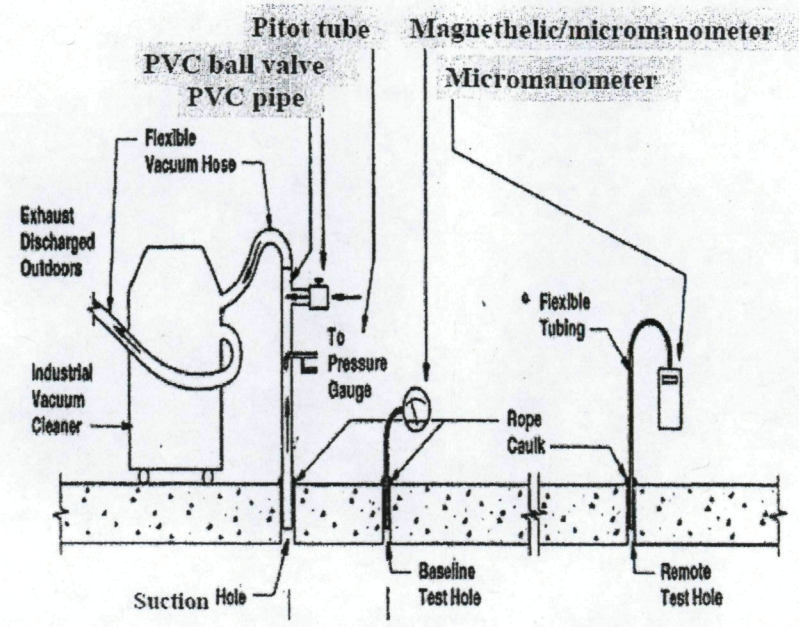


Condensate Bypass for a Vapor Mitigation System
(Not to Scale)



Allows water to go down the floor drain. Fits regular drains from 2" to 8"

A "Dranjer" for Sealing Floor Drain
(Not to Scale)



Layout for Diagnositc Testing
(Not to Scale)

Figure 1 – Drilling Details

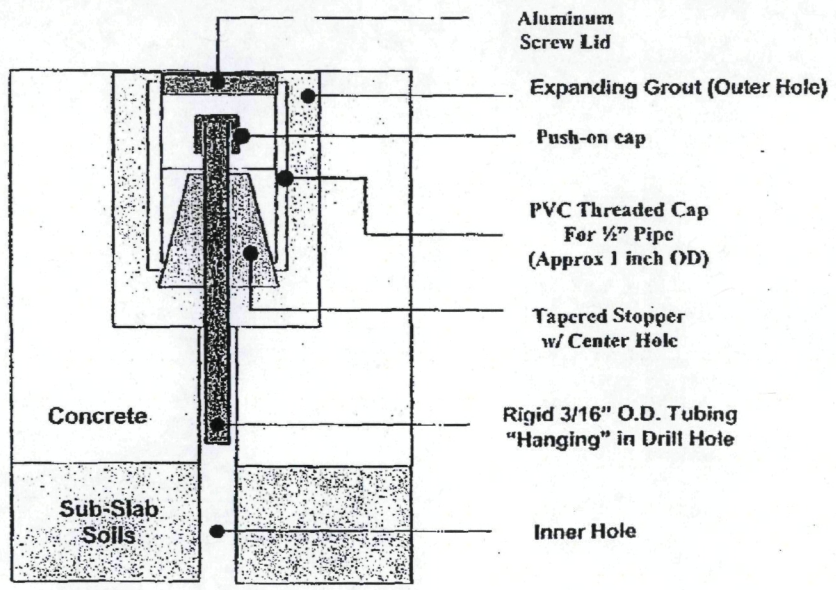
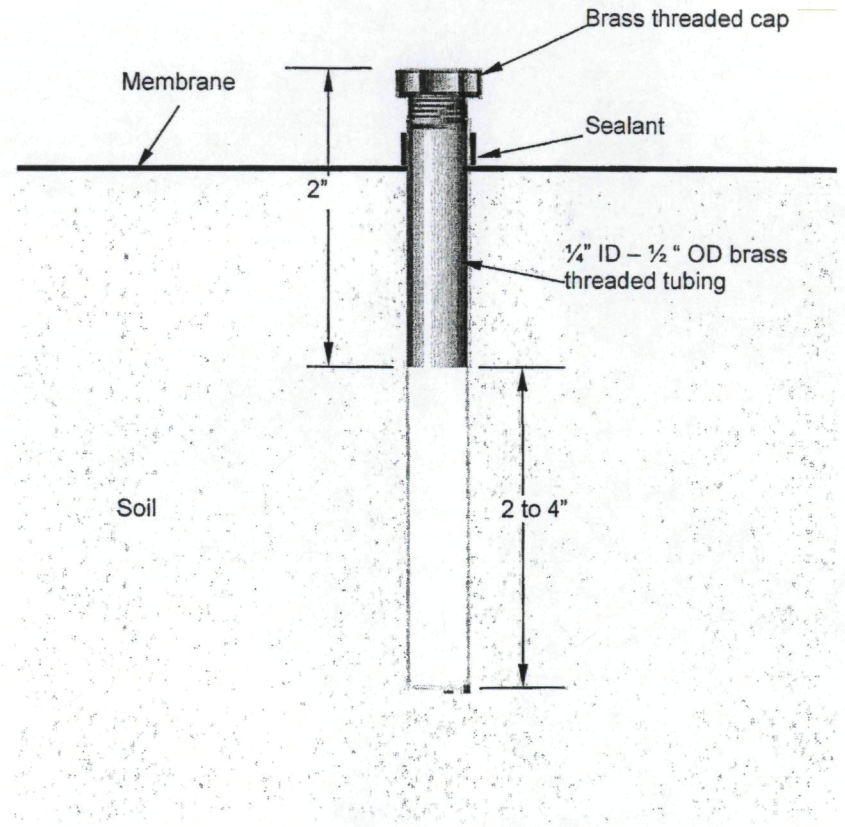


Figure 2 – Sub-Slab Monitoring Probe Details

Permanent Monitoring Point for Floor Slabs
(Not to Scale)



Permanent Monitoring Point for Membrane Systems
(Not to Scale)

DATE: 2/8/07
PROJECT NO.: 74060
FILE NAME: WORK PLANS
SUPERFUND SITE: NYANZA
PREPARED BY: CARL THUNBERG
CHECKED BY: KURT JELINEK

NOBIS ENGINEERING, INC.
18 Chenell Drive
Concord, New Hampshire
03301

US Army Corps of Engineers ®
New England District

UNITED STATES • ENVIRONMENTAL PROTECTION AGENCY

NYANZA CHEMICAL WASTE DUMP
SUPERFUND SITE
ASHLAND, MASSACHUSETTS

VAPOR MITIGATION SYSTEM SHOP DRAWING
SYSTEM DETAILS

FIGURE 4

Appendix A

Task Order : 0005 **Date:** 2/12/2007

Contract #: DACW33-03-D-0005 **Project:** Vapor Mitigation Systems, OU II Reme **Location:** Nyanza Chemical Waste Dump Superfund Site Ashland, Massachusetts **Contractor:** Nobis Engineering, Inc.

Spec Section	SD No., and Type of Submittal Material or Product Description	Spec Paragraph No.	Approval Type	Reviewer(s):	Document Tracking No.	Planned Submittal Date	Contractor Action: Date Forward to Approving Authority/ Date Received From Contractor	Approving Authority Action: Date Forwarded to other Reviewer	Date Received from other Reviewer	Action Code	Date of Action	Contractor Action: Mailed to Contractor/ Received from Approved Authority	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Work Plan		GA										
	Site Health and Safety Plan		GA										
	Material Specifications		GA										
	Warranties		GA										
	As-Built Drawings		GA										

SD Codes:
01 - Data
04 - Drawings
07 - Schedules
08 - Statements
09 - Reports
18 - Records

Classification:
GA: Government Approval
FIO: For Information Only

Reviewer:
E: Engineer/Planning Division
C: Construction/Operations Division

Action Codes:
A - Approved as submitted
B - Approved except as noted on drawings
C - Approved except as noted on drawings
Refer to attached sheet; resubmission required
D - Will be returned by separate correspondence
E - Dissaproved (See attached)
F - Receipt acknowledged
FX- Receipt acknowledged; does not comply as noted
G - Other

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES. OR MANUFACTURE'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL
SPECIFICATION SEC. NO. (Cover only one section with each transmittal)	PROJECT TITLE AND LOCATION Remedial Action, Keene USARC, Keene, NH		

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number/etc.)*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)*	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION *(See instruction No. 6)*	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Contractor / Sub. Name: _____

DAILY CONSTRUCTION QUALITY CONTROL REPORT

Nobis Job No: _____ Date: _____
Day: _____

Contract No.: _____ Delivery Order No: _____
Description and Location of Work: _____

Tide: N/A (high) (low) (high) (low) Sea Condition:
Weather: Temp: Cloud Condition: Wind Speed/ Direction:
Environmental Protection:
Management Area of responsibility
a. Contractor - _____
b. Subcontractor - _____
c. Subcontractor - _____
d. Purveyor - _____
e. Supplier - _____
f. Technical Support - _____

1. WORK PERFORMED TODAY (Indicate location and description of work performed. Refer to work performed by individuals listed by letter above.) _____

2. Results of Surveillance (Include satisfactory work completed, or deficiencies with action to be taken.)
a. Preparatory Inspection:

b. Initial Inspection:

c. Follow-up Inspection:

3. Tests Required by Specifications, Performed, and the Results:
a.
b.

4. Verbal Instruction Received: (List any instructions given by Government personnel on construction deficiencies, retesting required, etc. and action.)

5. Remarks: (Cover all conflicts in plans, specifications, or instructions.)

6. Safety Inspection (Report violations, corrective instruction given; and corrective actions taken.)

7. Quantities Completed/ Materials Received:
Item #
Quantity:
Item #
Quantity:

8. Date:

TRADE WORK	HOURS (on-site)	EMPLOYER	EQUIPMENT / HOURS IN-USE

9. Additional Comments:

Contractor's Verification: The above report is complete and correct and all material and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.

Contractor Quality Control Representative

PREPARATORY INSPECTION CHECKLIST
OU II REMEDIAL ACTION
NYANZA CHEMICAL WASTE DUMP SUPERFUND SITE

Contract Number: _____ Date: _____

Contract Title: _____

Major Definable Feature of Work: _____

Contract Drawings/Spec/Work Plan Reference: _____

A. Personnel Present:

Name	Position	Organization
1.		
2.		
3.		
4.		

B. Submittals Involved:

Number & Item	Approval Code/Remarks
1.	
2.	
3.	

(List additional items on reverse side)

C. Have all items involved been approved? YES___ NO ___

D. Are all materials on hand? YES___ NO ___

E. List items not on hand or not in accordance with submittals:

_____

_____

_____

PREPARATORY INSPECTION (continued)

F. Tests required in accordance with contract requirements:

	TEST	PARAGRAPH
1.		
2.		
3.		

G. Accident prevention preplanning topics:

1. _____
2. _____
3. _____

H. List Equipment Safety Checklists (attach):

1. _____
2. _____
3. _____

I. Remarks:

_____

_____

_____

Contractor Quality Control Representative _____

INITIAL INSPECTION CHECKLIST
OU II REMEDIAL ACTION
NYANZA CHEMICAL WASTE DUMP SUPERFUND SITE

Contract Number: _____ Date: _____

Contract Title: _____

Major Definable Feature of Work: _____

Contract Drawings/Spec/Work Plan Reference: _____

A. Personnel Present:

Name	Position	Organization

(list additional personnel on reverse side)

B. Materials being used are in strict compliance with approved shop drawings, contract plans, specifications or approved Work Plan: YES___ NO___

If not, explain: _____

_____

C. Procedures and/or work methods witnessed are in strict compliance with approved shop drawings, plans & specifications or Work Plan: YES___ NO___

If not, explain: _____

_____

D. Workmanship is acceptable: YES ___ NO ___

Indicate areas requiring improvement: _____

_____

_____

E. Safety violations & corrective action taken: _____

_____

Contractor Quality Control Representative _____

FOLLOW-UP INSPECTION CHECKLIST
OU II REMEDIAL ACTION
NYANZA CHEMICAL WASTE DUMP SUPERFUND SITE

Contract Number: _____ Date: _____

Contract Title: _____

Major Definable Feature of Work: _____

A. Deficiencies Noted:

B. Corrective Action Taken:

C. Pre-Final Inspection (Attach Punchlist)

_____
Contractor Quality Control Representative

PROJECT NAME _____

PROJECT NUMBER _____

PROJECT MONITOR _____

Deficiency Tracking List

DATE DISCOVERED	DEFICIENCY NOTED	DATE CORRECTED

Nobis

DATE ______________________

PROJECT ______________________

PROJECT MONITOR ______________________

Definable Features Of Work

DFOW	Preparatory Inspection		Initial Inspection	
	Proposed	**Actual**	**Proposed**	**Actual**

Nobis

DATE ____________________

PROJECT ____________________

PROJECT MONITOR ____________________

JOB SIGN-IN / OUT AND VISITORS LOG

PLEASE SIGN CLEARLY - All personnel must sign in or out every time they enter or exit work area.

NAME	EMPLOYER	TIME IN	TIME OUT	PURPOSE

PHOTOGRAPHS LOG FORM

PROJECT NAME:_____
NOBIS PROJECT NO._____

USACE CONTRACT NO:_____
DELIVERY ORDER NO._____

SERIAL NO.	DATE	PHOTOGRAPH DESCRIPTION

Appendix B

Appendix C

PRODUCT DATA

W. R. MEADOWS.
SEALTIGHT

CSI Code: 07110

No. 720

APRIL 2004
(Supersedes November 2002)

SEALMASTIC™ SOLVENT

Dampproofings

DESCRIPTION

SEALMASTIC Solvent-Type Dampproofings are asbestos-free, fibered and non-fibered asphalt compounds containing an exclusive wetting agent to convert a naturally hydrophobic surface to a hydrophilic surface to assure proper coating adhesion. Both the brush-on and trowel-applied versions are flexible and will span small holes and hairline cracks. All three grades withstand temperature changes and will not crack under normal expansion and contraction. The three types offered are: SPRAY-MASTIC™, a non-fibered asphalt compound for use where spray application is desired; SEMI-MASTIC™, a brush or spray-on fibered asphalt compound designed to protect exterior below-grade masonry walls; TROWEL-MASTIC™, a trowel-applied heavy-bodied, fibered asphalt compound for exterior, below-grade masonry wall surface applications. It is recommended to protect porous or irregular surfaces. All SEALMASTIC products meet the VOC content limits of 500 g/L for Bituminous Coatings and Mastics as required by the U.S. EPA Architectural Coatings Rule.

USES

SEALMASTIC Solvent-Type Dampproofing Coatings are ideal for reducing dampness and moisture infiltration through foundation walls, parapets, fire walls, tanks, culverts, cisterns and bridge abutments. They are also applicable for stone-backing, above-grade cavity wall applications and below-grade masonry wall dampproofing. The SEALMASTIC product line also helps to minimize internal structural damage from mildew and mold.

PACKAGING

5 Gallon (18.93 Liter) Pails
55 Gallon (208.20 Liter) Drums

SPECIFICATIONS

SPRAY-MASTIC	ASTM D 4479, Type 1
SEMI-MASTIC	ASTM D 4479, Type 1
TROWEL-MASTIC	ASTM D 4586, Type 1

FEATURES AND BENEFITS

- Ready-to-use...no heating or thinning required
- Dries rapidly...fast and economical way to protect concrete and masonry foundation walls from moisture penetration
- Easy-to-apply...no "special" equipment needed
- Available in spray, brush and trowel grades...meets a broad range of applications for maximum versatility
- VOC compliant...meets the U.S. EPA Architectural Coatings Rule requirements

COVERAGE*

SPRAY-MASTIC

As a primer (Two-Coat System):Approximately 70-100 sq. ft./gal. (1.71 to 2.45 sq. m/L)

Exterior Below Grade Dense Surfaces, Exterior Below Grade Porous Surfaces, Interior Above Grade Surfaces:

(One coat, 1/16" wet film thickness): Approximately 20-25 sq. ft./gal. (0.5 to 0.6 sq. m/L)

(One coat, 1/8" wet film thickness): Approximately 10-12.5 sq. ft./gal. (0.25 to 0.3 sq. m/L)

SEMI-MASTIC & TROWEL-MASTIC

Exterior Below Grade Dense Surfaces, Exterior Below Grade Porous Surfaces, Interior Above Grade Surfaces:

(One-coat, 1/16" wet film thickness): Approximately 20-25 sq.ft./gal. (0.5 to 0.6 sq.m/L).

(One-coat, 1/8" wet film thickness): Approximately 10-12.5 sq.ft./gal. (0.25 to 0.3 sq.m/L)

*Coverage may vary due to porosity and condition of concrete.

ADDITIONAL DAMPPROOFING PRODUCTS FROM W. R. MEADOWS CAN BE FOUND BY VISITING OUR WEBSITE: www.wrmeadows.com

CONTINUED ON REVERSE SIDE...

W.R. MEADOWS, INC.
P.O. Box 338 • HAMPSHIRE, IL 60140-0338
Phone: 847/214-2100 • Fax: 847/683-4544
1-800-342-5976
www.wrmeadows.com

Application Tools


Trowel


Soft Bristle Brush


Electric Drill with Jiffy Mixer


Ratio Pump


Wire Brush

PPLICATION

IRFACE PREPARATION...All surfaces to be coated must be thoroughly cleaned of scale, loose mortar, dust, rust, dirt, oil, grease and other foreign matter. Use a wire ush, sandblast or other methods in keeping with good construction practices. Before oduct application, fill voids, cracks and holes in concrete with cement mortar and ow to dry. If primer is required, use SEALMASTIC SPRAY-MASTIC. Do not apply ien temperatures below 35°F (2°C) are anticipated. Do not apply in rain or when n is threatening.

IXING...SEMI-MASTIC and SPRAY-MASTIC should be thoroughly stirred in eir respective containers prior to application. TROWEL-MASTIC can be applied ectly from the container.

XTERIOR BELOW-GRADE DENSE SURFACES

pply SEMI-MASTIC (Brush or Spray Grade) and SPRAY-MASTIC (Spray Grade) soft bristle brush or suitable spray equipment* or TROWEL-MASTIC by trowel.

l dampproofings should be applied to properly prepared surfaces in a continuous, en film, free of pinholes, filling and spreading around all joints, slots and s and penetrating into all crevices, chases, reveals, soffits and corners. Carry ating over the exposed footing's top and outside edge up to finished grade.

OTE: Fillers, extenders and additives in concrete mixes can produce a higher than rmal porosity and as a result, additional coverage coats may be required.

Consult spray equipment manufacturer for instructions

XTERIOR BELOW-GRADE POROUS SURFACES (3) OPTIONS

MEMBRANE SYSTEM: For severe conditions or for added protection, apply one coat of TROWEL-MASTIC, SEMI-MASTIC or SPRAY-MASTIC on porous surfaces, such as block, according to Dense Surface Application.

Within four hours, apply a glass fabric membrane cloth over all coating surfaces. Overlap all edges by 3" (76mm) minimum. Press firmly into place without wrinkles. Application of the second coat of TROWEL-MASTIC, SEMI-MASTIC or SPRAY-MASTIC should be within 24 hours.

2. ***TWO-COAT SYSTEM:*** Apply SEALMASTIC SPRAY-MASTIC as a prime coat. Allow coat to dry tacky to touch and then apply TROWEL-MASTIC in one coat, as described under Dense Surface Application.
3. ***PARGE COAT SYSTEM:*** Before application of SEALMASTIC DAMPPROOFINGS, apply a heavy parge coat of cement mortar for surface preparation. The coat should cover the bottom of the footings to grade level, forming a cove at the junction of the wall and footing. Once the parge coat cures, apply two brush or spray coats of SEMI-MASTIC or SPRAY-MASTIC, or one coat of TROWEL-MASTIC, as described under Dense Surface Application.

BACKFILLING

Backfilling should be done within 24 to 48 hours after application. No longer than seven days maximum should elapse. Be careful not to damage or rupture the film or displace coating or membranes. To assure maximum protection, Protection Boards from W. R. MEADOWS should be used. Prolonged exposure to ultraviolet sunrays should be minimized.

INTERIOR ABOVE-GRADE SURFACES-VAPOR RETARDER

TROWEL-MASTIC, SEMI-MASTIC and SPRAY-MASTIC can be used individually or in combination for dampproofing the exterior face of interior walls in cavity wall construction.

CLEAN UP...While still wet, material may be removed with soap and water. Once dried, the material can be removed with kerosene or petroleum naptha. Solvent manufacturer precautions should be adhered to when using a solvent for clean up.

PRECAUTIONS

Handle as a combustible product. Read and follow application information and precautions. Refer to Material Safety Data Sheet for complete health and safety information.

TO VERIFY MOST RECENT TECHNICAL DATA SHEET IS BEING USED, VISIT OUR WEBSITE: www.wrmeadows.com

LIMITED WARRANTY

"W. R. MEADOWS, INC. warrants at the time and place we make shipment, our material will be of good quality and will conform with our published specifications in force on the date of acceptance of the order." Read complete warranty. Copy furnished upon request.

Disclaimer

The information contained herein is included for illustrative purposes only, and to the best of our knowledge, is accurate and reliable. W. R. MEADOWS, INC. cannot however under any circumstances make any guarantee of results or assume any obligation or liability in connection with the use of this information. As W. R. MEADOWS, INC. has no l over the use to which others may put its product, it is recommended that the products be tested to determine if suitable for specific plication and/or our information is valid in a particular circumstance. Responsibility remains with the architect or engineer, contractor d owner for the design, application and proper installation of each product. Specifier and user shall determine the suitability of products r specific application and assume all responsibilities in connection therewith.

CHEMICALS FOR CONCRETE CONSTRUCTION

HYDRAULIC CEMENT

Contact Us | Select another product:

Download **this catalog page** (144 kb PDF)
Download **the MSDS** (PDF)

Get the free Adobe Acrobat Reader

Description

Unitex HYDRAULIC CEMENT is a blend of hydraulic cement and admixtures used for plugging and stopping water or fluid leaks in concrete structures and masonry walls.

When mixed to a thick consistency and hand formed, HYDRAULIC CEMENT will set in 3-5 minutes to seal out water for the life of the structure. HYDRAULIC CEMENT is a non-corrosive, non-rusting and non-shrink material.

Features

- Contains no gypsum
- Non-metallic – will not rust or corrode
- Durable – provides lifetime repairs
- Vertical and overhead applications
- Resistant – withstands freeze/thaw cycles
- Fast-setting – sets in 3-5 minutes
- Performance – instantly stops seepage
- Consistent – strict quality control testing and standards
- Non-corrosive, non-metallic, non-shrink
- Pre-blended – just add water

Usage

- Dams, culverts
- Basement walls
- Swimming pools
- Manholes, cisterns
- Water tanks
- Underground electric vaults
- Elevator pits
- Mines, tunnels
- Sewer, water pipes
- Any situation requiring a fast, durable, long-lasting repair

Physical Properties

Compressive Strength (ASTM C-109*)

1 DAY	3 DAYS	7 DAYS	28 DAYS
4,200 psi	4,300 psi	4,500 psi	6,100 psi
28.94 MPa	29.63 MPa	31.00 MPa	42.03 MPa

*Notes: 73°F (22.8°C)
55% Humidity
5 qt. water/50 lb. material

Rate of Set (ASTM C-266)

INITIAL	FINAL
3 min.	5 min.

Yield

0.43 cu. ft./50 lb. pail (0.012 cu. m/22.7 kg. pail) when mixed with 4 qt. of water

Packaging

Application

SURFACE PREPARATION: All surfaces in contact with HYDRAULIC CEMENT shall be free of dirt, oil, grease, laitance, and other contaminants. Best results will be obtained by undercutting the area to be filled. Small cracks should be enlarged to maximize bonding area. The area to be repaired must be saturated with water before placement (SSDÐsaturated surface dry). If possible, remove any standing water prior to repair. Maintain contact areas between 40°F (7°C) and 90°F (32°C) prior to repair, and during initial curing period. For hot and cold weather patching applications, refer to ACI 305 Hot Weather Conditions or ACI 306 Cold Weather Conditions.

MIXING: For best results, add HYDRAULIC CEMENT to clean, potable water in a small mixing vessel. Mix to a stiff, putty consistency and mix only enough material that can be placed immediately.
PLACING: For general repairs, force material into the area to be repaired by gloved hand or with a trowel. Fill to the full depth and trowel to final level without overworking the material. To stop running water, mold material by gloved hand into a ball or wedge shape and hold HYDRAULIC CEMENT in gloved hand or on a trowel until material becomes warm. Press firmly into opening and maintain pressure on the patch until material stops the leak or approximately 3-5 minutes. Trowel material into final shape without damaging plug. For sealing cracks in walls or floors, force Hydraulic Cement into the crack by starting at the area with the least amount of pressure. Hold into place and maintain pressure until the material has hardened. HYDRAULIC CEMENT will not permanently repair cracks and joints subjected to thermal or structural movement.

STORAGE: Normal cement storage and handling practices should be observed. Store in a cool, dry place. Read and follow application information, precautions, and Material Safety Data Sheet.

50 lb. pail (22.7 kg)

View packaging & accessories

Limitations

- Do not apply when temperature is below 40°F or when the temperature is expected to fall below 40°F within 48 hours.
- Do not apply over surfaces that are frozen or contain frost.
- The wearing of protective gloves is recommended.
- Mix only enough material as can be used immediately.
- Do not apply over any active faults or cracks in the substrate without addressing any movement that may occur.

Cautions

- Contains portland cement (CAS# 65991-15-1). Do not allow contact with eyes or skin.
- Contains concrete aggregates, sand/gravel (CAS# 14808-60-7).
- Avoid breathing dust. Respirable silica may cause serious lung problems.
- There is limited evidence silica is a carcinogen. The use of gloves, goggles and, where appropriate, dust masks and other protective clothing is recommended.

Technical Bulletin

2400 Boston Street, Suite 200, Baltimore, Maryland 21224
Phone: 410-675-2100 or 800-543-3840

Revised: 8/9/05

DAP® DYNAFLEX 230® Premium Elastomeric Latex Sealant

- **50 year durability guarantee**
- **Permanently flexible**
- **Withstands up to 50% joint movement**
- **Cured sealant is mildew resistant**
- **Paintable**

Packaging:	10.1 fl. oz. (300 mL)
Color:	White, Almond, Aluminum Gray, Brown, Cedar Tan, Dark Bronze
UPC Number:	18300, 18412, 18301, 18302, 18303, 18306, 18275, 18298, 18412, 18286, 18418, 18420, 18288, 74084, 74080, 74096, 74108, 74120, 74086

Company Identification:

Manufacturer:	DAP Inc., 2400 Boston St., Baltimore, Maryland 21224
Usage Information:	DAP HELPLINE: 888-DAP-TIPS, 9:00 am to 7:00 pm EST.
Order Information:	800-327-3339
Fax Number:	410-534-2650

Also, visit the DAP website at **www.dap.com.**

Product Description:

DYNAFLEX 230® Premium Elastomeric Latex Sealant is a superior quality, technologically advanced sealant. It combines the durability and flexibility associated with a silicone, with the paintability, low odor and water clean up of a latex sealant. It is permanently flexible, withstanding up to 50% total joint movement without cracking or loosing adhesion. DYNAFLEX 230® is unaffected by temperature extremes (-30°F to 180°F). Cured caulk is mildew resistant. Paintable with latex or oil-based paints. Interior and exterior use.

Suggested Uses:

Ideal for caulking and Sealing:

- *Window and door frames*
- *Moldings*
- *Baseboards*
- *Pipes*
- *Butt joints*
- *Corner joint*
- *Siding and trim*
- *Crown Molding*
- *Other gaps and openings*

Outstanding Adhesion to:

- *Wood*
- *Aluminum*
- *Vinyl*
- *Plaster and drywall*
- *Painted surfaces*
- *Metal*
- *Glass*
- *Masonry*
- *Stucco*
- *Brick*
- *Concrete*
- *Most plastics*
- *Stone*

Performance Characteristics:

- Meets the requirements of ASTM C 920 standard specification for Elastomeric joint sealants, Type S, Grade NS, Class 25. Use NT, G, A and M.
- Meets the performance specifications of Federal Spec TT-S-00230c (COMNBS0), Type II, Class A.
- Exceeds ASTM Spec C 834 Standard Specification for Latex Sealants.
- Cured sealant is mildew resistant.
- Provides a tight yet permanently flexible seal.
- Paintable with latex or oil-based paints.
- 50 Year Durability Guarantee
- Easy water clean-up.
- Tack free in 30 minutes

Surface Preparation & Application:

- Surface must be clean, dry and free of all old caulk, dirt, dust, and grease.
- Cut nozzle at 45° angle to desired bead size.
- Load cartridge into caulking gun.
- Fill gap with sealant, pushing sealant ahead of nozzle.
- For a neat finish, smooth bead of sealant with a finishing tool.
- Clean up excess sealant with a damp cloth before it skins over (15 minutes).

For Best Results:

- Caulk in temperatures above 40°F and rising.
- Store sealant away from extreme heat or cold.
- Do not use for below waterline applications, marine/automobile applications, or filling surface defects.
- If joint depth exceeds 1/2", use foam backer road.
- Allow sealant to dry at least 2 hours (longer in cool or humid conditions) before painting with latex or oil-based paints.
- Do not use if rain or freezing temperatures are forecasted for at least 4 days.

Physical & Chemical Characteristics:

Tooling Time:	10 Minutes
Tack-Free Time:	30 Minutes
Dynamic Joint Movement:	± 25%
Life Expectancy:	50+ Years
Paintable:	Yes
Odor:	Very Mild
Consistency:	Smooth and Creamy
Vehicle:	Advanced Acrylic Polymer
Volatile:	Water
Flash Point:	None
Filler:	White/Colors: Calcium Carbonate
Density:	White/Colors: 1.48 ± 0.01
Solids:	White/Colors: 82.0% ± 1.0% by weight
Weight per Gallon:	White/Colors: 12.35 ± 0.05 lbs./gal.
Temperature Service Range:	-30°F to 180°F
Temperature Application Range:	40°F to 100°F
Freeze Thaw Stability:	Passes 5 Cycles 0°F (1 cycle = 16 hrs. @ 0°F, 8 hrs. @ 70°F)
Shelf Life:	1 Year
Coverage:	55 linear ft. at a 3/16" bead size.
MSDS No:	10001

Clean Up:
Clean up excess sealant with a damp cloth before it skins over. Wash hands with warm water and soap. Dried material must be cut or scraped away.

Safety:
See product label or Material Safety Data Sheet for safety information. You can request an MSDS sheet by visiting our website at www.dap.com or by calling 888-DAP-TIPS.

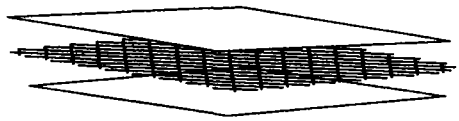
Warranty Information:
If not satisfied with product performance when used as directed, return used container and sales receipt to DAP Inc., Technical Customer Service, 2400 Boston St., Baltimore, MD, 21224, for product replacement or, sales price refund. DAP will not be liable for incidental or consequential damage.

An RPM Company

TECHNICAL INFORMATION ON

GRIFFOLYN® TX-1200®FR

Griffolyn TX-1200 FR is a 3-ply laminate combining two layers of fire retardant linear low density polyethylene and a high-strength cord grid.



Griffolyn TX-1200FR is specifically engineered to provide high strength and durability in a lightweight material.

FEATURES

- Passes NFPA 701 Large Scale — Standard Methods of Fire Tests for Flame-Resistant Textiles and Films.
- Class I, Class A flame spread rating per UBC-42 and ASTM E-84.
- Multiple layers and cord reinforcement resist punctures and tears.
- Cold-crack resistance eliminates failures in cold temperatures.
- Low permeability greatly inhibits moisture transmission.
- Flexibility and light weight allow for easy handling and quick installation.
- Custom fabrication is available to meet your exact specifications.
- Long life expectancy allows for significant cost savings through reuse and fewer replacements.

SUGGESTED APPLICATIONS

- Temporary walls, plant dividers, building enclosures and containment tents.
- Laydown covers, dust partitions and cleanroom enclosures.
- Architectural vapor barrier in walls & ceilings and in roofing systems.
- Pallet, cask and drum covers for outside storage.
- Shipping container covers and liners.

Griffolyn®

Call today for technical assistance or to place your order.

800/231-6074

REEF INDUSTRIES, INC

P.O. Box 750250
Houston
Texas 77275-0250
713 507-4200
713 507-4205 Fax

Product Testing Data TX-1200 FR

Physical Properties and Typical Values			
Property	**ASTM Test**	**U.S. Value**	**Metric Value**
Standard Weight	D-2103	40 lb/1000 ft^2	19.5 kg/100 m^2
3" Tensile Strength @ Yield	D-882	66.0 lbf	294.0 N
3" Elongation	D-882	500%	500%
PPT Resistance	D-2582	16.6 lbf	74.0 N
Tongue Tear	D-751B	14.1 lbf	62.8 N
Cold Crack	D-1709 (mod.)	-15°F	-27°C
Drop Dart	D-1709	1.70 lb	770 g
Fire Retardancy	E-84	0 flame spread 50 smoke developed	
NFPA 701 Large Scale Fire Retardance Test		Pass	

Ordering Information

Available Colors

Natural, Yellow, Green, Red

Sizes

Stock rolls from 4' x 100' to 40' x 100' in increments of 4' widths are available for immediate shipment. Stock length and width tolerances are ±1% (minimum 2").

Custom sizes up to 100' x 200' and custom fabrication are available to meet your exact specifications.

Outdoor Exposure

Under normal continuous exposure the average life expectancy ranges from 10 to 12 months, depending on color.

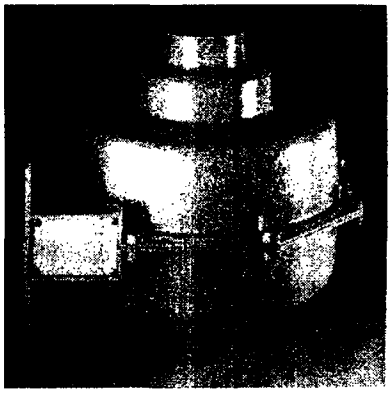
Usable Temperature Range

Minimum -15°F -27°C
Maximum 170°F 77°C

REEF INDUSTRIES, INC.

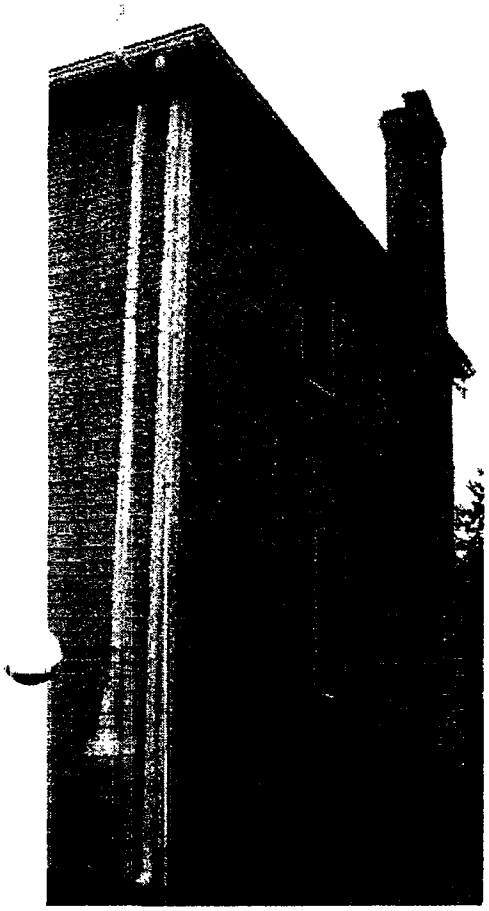
RadonAway™

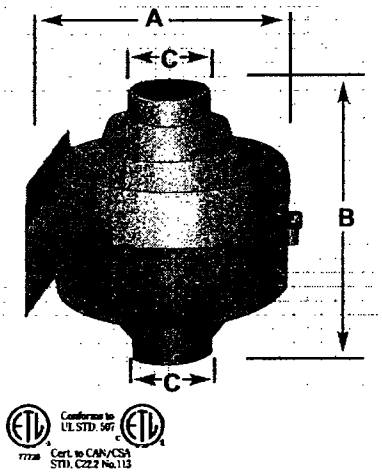
GP Series



Radon Mitigation Fans

Specially designed for radon mitigation, GP Series Fans provide a wide range of performance that makes them ideal for most subslab radon mitigation systems.





- **5-Year Warranty**
- **Mounts on duct pipe or with integral flange**
- **3" diameter ducts for use with 3" or 4" pipe**
- **Electrical box for hard wire or plug in**
- **ETL Listed - for indoor or outdoor use.**

Model	Dimensions		
	A	B	C Duct Size
GP series	12.5"	13"	3"

The following chart shows performance of GP Series fans:

Model	Watts	Maximum Pressure "WC	Typical CFM vs. Static Pressure WC						
			1.0"	1.5"	2.0"	2.5"	3.0"	3.5"	4.0"
GP201	40-60	2.0	82	58	5	-	-	-	-
GP301	55-90	2.6	92	77	45	10	-	-	-
GP401	60-110	3.4	93	82	60	40	15	-	-
GP501	70-140	4.2	95	87	80	70	57	30	10

Choice of model is dependent on certain building characteristics including sub-slab materials and should be made by a radon professional.

For Further Information Contact:

0902
P/N 02002